

U.S. HARD RED SPRING WHEAT

Minnesota • Montana • North Dakota • South Dakota



2008 | **REGIONAL**
QUALITY REPORT

THE ARISTOCRAT OF WHEAT

HARD RED SPRING—a specialty wheat grown primarily in the Northern Plains of the United States—stands out as the aristocrat of wheat when it comes to baking bread. The high protein content and superior gluten quality of hard red spring wheat make it ideal for use in some of the world's finest baked goods. Yeast breads, hard rolls and specialty products such as hearth breads, whole grain breads, bagels and pizza crusts look and taste their best when baked with top quality spring wheat flour. Even frozen dough products are better with spring wheat because they can be stored longer than those made with lower protein wheats.

Flour mills in the United States and around the world also use hard red spring wheat extensively as a blending wheat to increase the gluten strength in a batch of flour. Adding hard red spring to lower protein wheat improves dough handling and mixing characteristics as well as water absorption. The resulting flour can be used to make an assortment of bread products, as well as Chinese-type noodles.

2008 OVERVIEW

The overall average of the 2008 U.S. hard red spring wheat crop is a No. 1 Northern Spring. Production is up 13 percent compared to 2007. Three-fourths of the crop is a No. 1 grade as the crop boasts little to no damage and a high average test weight on a region wide basis. However, there is a wider distribution of some quality parameters in the crop this year and a lower vitreous kernel level, due to extremes in growing conditions and yields across the region.

Disease pressures were nearly non-existent as reflected in the mere 0.1 percent average damage level. The average test weight is 61 lb/bu (80.2 kg/hl) equal to last year and the five-year average, but about 10 percent of the crop falls below 57 lb/bu (75.1 kg/hl) due to severe drought conditions in some western areas. Across all production districts, the crop displays heavier 1000 KWT's and lower kernel ash levels, most notably in western areas.

Average protein is equal to last year and the five-year average at 14.3 percent despite a wider than normal spread in protein levels across the region. The distribution of protein in eastern areas shows a higher percentage of the crop below 13.5 percent protein compared to last year, while western areas show less of a comparative shift. Although protein spreads are wider in 2008, more than half of the crop is still between 13 and 15 percent protein, higher than last year.

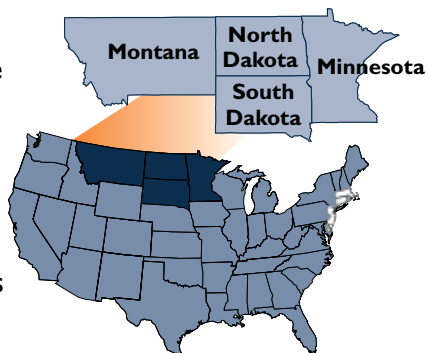
Milling performance indicates an increase in extraction levels, but also a corresponding increase in flour ash and starch damage. Some of the increase in extraction levels may be due to the use of a new Buhler laboratory mill used in analyzing this year's crop, but the increased 1000 KWT in western areas and an increase in average kernel size are also likely contributing factors.

Dough performance reveals higher absorption levels that are a full percentage point higher than both last year and the five-year average. Farinograph stability indicates a much weaker mixing crop

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compared to last year and the traditional levels expected from U.S. hard red spring wheat. Stability times as a whole average 11 minutes, down from 22 last year and 18 for a five-year average. Region-wide dough mixing strength is weaker than average. This year's much higher yields, a cooler growing season and the absence of any notable crop stress during the growing season are all contributing factors.



Bake tests crop indicate loaf volumes that are similar to 2007, although still down from the five-year average. Bread quality factors scored very high for all factors, indicating the absence of any quality degradation due to disease pressures or harvest rains.

Buyers will find many positive attributes in the high grading 2008 hard red spring wheat crop. The wider distribution of some quality parameters needs to be considered when establishing contract specifications, and the

weaker mixing properties of the 2008 crop may require more diligent work with suppliers to guarantee buyers receive the quality that meets their needs.

SEASONAL CONDITIONS

PLANTING progress

was near normal due to good weather conditions, with the exception of some delays in the eastern portion of the region. Planting was finished by the end of May, slightly ahead of average.

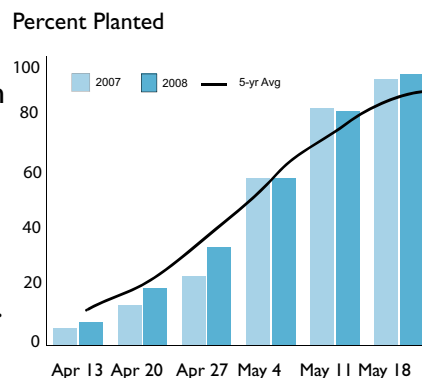
Emergence was slower than normal due to cool,

dry conditions in the west and cool, wet conditions in the east. Extremely low subsoil and topsoil moisture supplies were an acute problem in western areas.

GROWING conditions improved in June as temperatures became warmer and adequate precipitation fell across the region. In July hot, dry conditions prevailed stressing the crop in the western areas of the region and affecting yield potential. The crop in the eastern areas of the region was not adversely affected due to adequate soil moisture levels. The one benefit of the dry conditions was lack of disease issues.

HARVEST was one to two weeks behind normal, beginning in early August. Weather conditions were nearly ideal during the majority of the harvest until rain showers disrupted a small portion of the crop near the end of harvest. The majority of the harvest was completed by mid-September.

Hard Red Spring Planting Progress

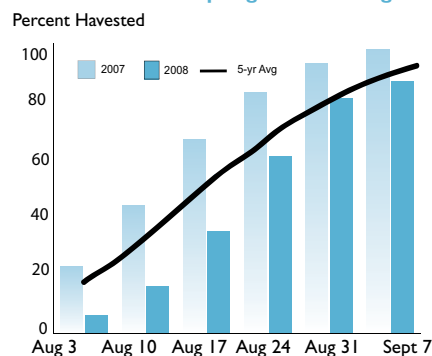


Hard Red Spring Wheat Production

	2007	2008	2003-07 AVERAGE
MILLION BUSHELS			
Minnesota	78	101	84
Montana	55	60	70
North Dakota	234	246	233
South Dakota	52	68	58
Regional Total	419	475	445
U.S.Total	449	512	475
MILLION METRIC TONS			
Minnesota	2.12	2.74	2.28
Montana	1.49	1.62	1.90
North Dakota	6.37	6.71	6.35
South Dakota	1.41	1.86	1.59
Regional Total	11.40	12.93	12.12
U.S.Total	12.22	13.94	12.93

Source: USDA • September 2008 Small Grains Summary

Hard Red Spring Harvest Progress



WHEAT CHARACTERISTICS

Wheat grades, as defined by the Federal Grain Inspection Service (FGIS) of the USDA Grain Inspection, Packers and Stockyards Administration (GIPSA), reflect the general quality and condition of a representative sample. U.S. grades are based on test weight and include limits on damaged kernels, foreign material, shrunken and broken kernels, and wheat of contrasting classes. Each determination is made on the basis of the grain when free from dockage.

SUBCLASSES

Subclass is a separate marketing factor based on the number of kernels with a complete, hard and vitreous endosperm, the portion that makes flour. For hard red spring wheat the subclasses are:

- Dark Northern Spring (DNS)—at least 75 percent or more dark, hard, vitreous kernels;
- Northern Spring (NS)—between 25 and 74 percent dark, hard, vitreous kernels;
- Red Spring (RS)—less than 25 percent dark, hard, vitreous kernels.

Wheat samples were obtained in Montana, North Dakota, South Dakota and Minnesota in the crop reporting areas identified in color. Samples were gathered during harvest from growers, farm bins and country elevators.

OFFICIAL U.S. GRADES AND GRADE REQUIREMENTS (Revised June 1993)

	U.S. Grades				
GRADING FACTORS	1	2	3	4	5
HARD RED SPRING - MINIMUM TEST WEIGHTS					
Pounds per bushel	58.0	57.0	55.0	53.0	50.0
Kilograms per hectoliter	76.4	75.1	72.5	69.9	66.0
MAXIMUM PERCENT LIMITS OF:					
Defects					
Damaged kernels					
Heat (part of total)	0.2	0.2	0.5	1.0	3.0
Total	2.0	4.0	7.0	10.0	15.0
Foreign material	0.4	0.7	1.3	3.0	5.0
Shrunken/broken kernels	3.0	5.0	8.0	12.0	20.0
Total ¹	3.0	5.0	8.0	12.0	20.0
Wheat of other classes ²					
Contrasting classes	1.0	2.0	3.0	10.0	10.0
Total ³	3.0	5.0	10.0	10.0	10.0
Stones	0.1	0.1	0.1	0.1	0.1
MAXIMUM COUNT LIMITS OF:					
Other material					
Animal filth	1	1	1	1	1
Castor beans	1	1	1	1	1
Crotalaria seeds	2	2	2	2	2
Glass	0	0	0	0	0
Stones	3	3	3	3	3
Unknown foreign substances	3	3	3	3	3
Total ⁴	4	4	4	4	4
Insect-damaged kernels in 100 grams	31	31	31	31	31

U.S. Sample grade is wheat that:

(a) Does not meet the requirements for U.S. Nos. 1, 2, 3, 4, or 5; or

(b) Has a musty, sour, or commercially objectionable foreign odor (except smut or garlic odor); or

(c) is heating or of distinctly low quality.

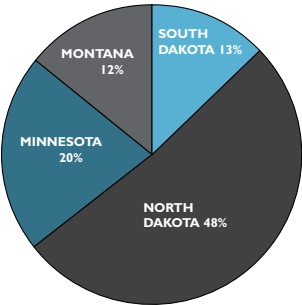
¹ Includes damaged kernels (total), foreign material, and shrunken and broken kernels.

² Unclassed wheat of any grade may contain not more than 10.0 percent of wheat of other classes.

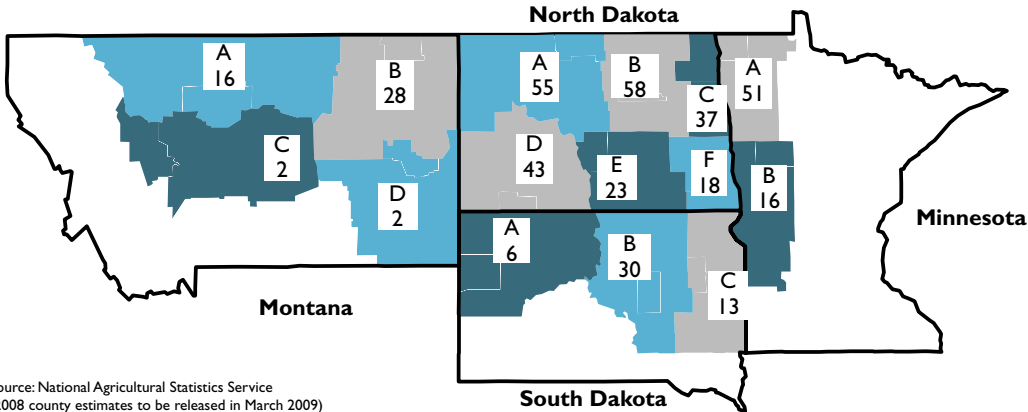
³ Includes contrasting classes.

⁴ Includes any combination of animal filth, castor beans, crotalaria seeds, glass, stones, or unknown foreign substance.

CROP REPORTING AREAS & 2007 HARD RED SPRING WHEAT PRODUCTION (million bushels)



Share of 2008 U.S. HRS Production



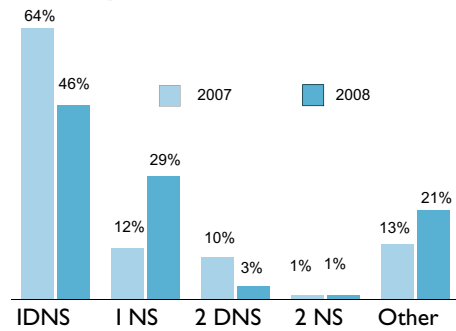
Source: National Agricultural Statistics Service (2008 county estimates to be released in March 2009)

WHEAT GRADING DATA

OVERALL GRADE

The average grade for the region is 1 NS. This grade reflects the average vitreous kernel content of 71 percent. Of the 15 composite samples, five graded 1 DNS, nine graded 1 NS, and one graded 3 DNS.

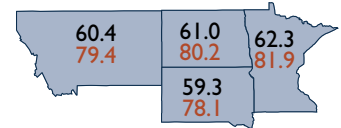
Regional Grade Distribution



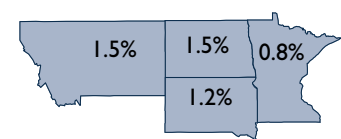
Seventy-five percent of 2008 samples grade No. 1 NS or better.

STATE AND CROP REPORTING AREA	TEST WEIGHT LBS/BU	TEST WEIGHT KG/HL	DAMAGE %	FOREIGN MATERIAL %	SHRUNKEN/ BROKEN KERNELS %	TOTAL DEFECTS %	CONTRASTING CLASSES %	U.S. GRADE	VITREOUS KERNELS %
MINNESOTA									
Area A	62.6	82.3	0.2	0.0	0.6	0.8	0.0	1 NS	65
Area B	61.5	80.9	0.2	0.0	0.7	0.9	0.0	1 NS	51
State Avg. 2008	62.3	81.9	0.2	0.0	0.6	0.8	0.0	1 NS	61
State Avg. 2007	62.1	81.7	0.1	0.0	0.8	0.9	0.0	1 NS	64
MONTANA									
Area A	60.6	79.7	0.0	0.0	1.1	1.1	0.0	1 DNS	87
Area B	60.0	78.9	0.0	0.0	2.0	2.0	0.0	1 DNS	92
Area C	61.7	81.1	0.0	0.0	0.9	0.9	0.0	1 DNS	94
Area D	61.0	80.2	0.0	0.0	1.2	1.2	0.0	1 DNS	80
State Avg. 2008	60.4	79.4	0.0	0.0	1.5	1.5	0.0	1 DNS	90
State Avg. 2007	59.1	77.8	0.0	0.0	2.2	2.2	0.0	1 DNS	95
NORTH DAKOTA									
Area A	60.9	80.1	0.0	0.0	1.5	1.5	0.0	1 DNS	83
Area B	62.3	81.9	0.1	0.0	0.5	0.6	0.0	1 NS	73
Area C	63.3	83.2	0.4	0.0	0.4	0.8	0.0	1 NS	70
Area D	56.8	74.8	0.0	0.0	3.9	3.9	0.0	3 DNS	89
Area E	61.1	80.4	0.3	0.1	1.0	1.4	0.0	1 NS	52
Area F	61.7	81.1	0.1	0.0	0.6	0.7	0.0	1 NS	61
State Avg. 2008	61.0	80.2	0.1	0.0	1.4	1.5	0.0	1 NS	74
State Avg. 2007	61.4	80.7	0.1	0.0	1.1	1.3	0.0	1 DNS	80
SOUTH DAKOTA									
Area A	58.7	77.3	0.1	0.0	1.8	1.9	0.0	1 NS	55
Area B	59.0	77.6	0.1	0.0	1.1	1.2	0.0	1 NS	60
Area C	60.3	79.3	0.2	0.0	0.8	1.0	0.0	1 NS	53
State Avg. 2008	59.3	78.1	0.1	0.0	1.1	1.2	0.0	1 NS	57
State Avg. 2007	60.7	79.9	0.2	0.0	1.6	1.7	0.0	1 DNS	83
FOUR-STATE REGION									
Avg. 2008	61.0	80.2	0.1	0.0	1.2	1.3	0.0	1 NS	71
Avg. 2007	61.1	80.4	0.1	0.0	1.3	1.4	0.0	1 DNS	79
Five-Year Avg.	60.9	80.1	0.5	0.0	1.2	1.6	0.0	1 DNS	75

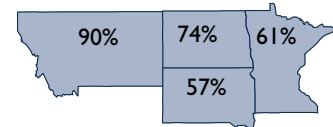
TEST WEIGHT BY STATE



AVERAGE TOTAL DEFECTS BY STATE



AVERAGE VITREOUS KERNELS BY STATE

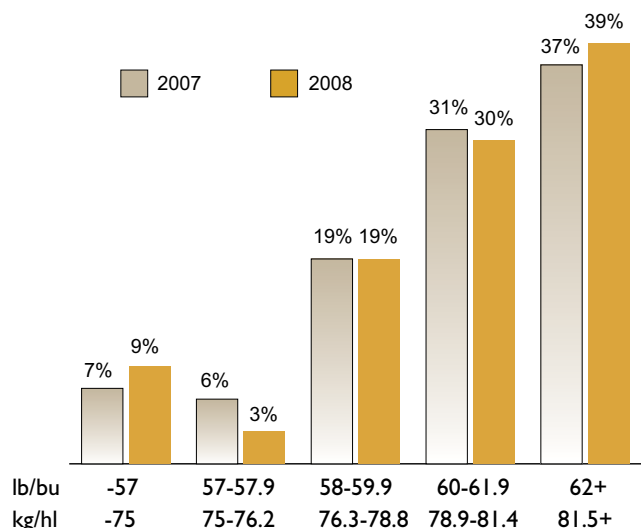


All state and regional averages have been adjusted to reflect production differences.



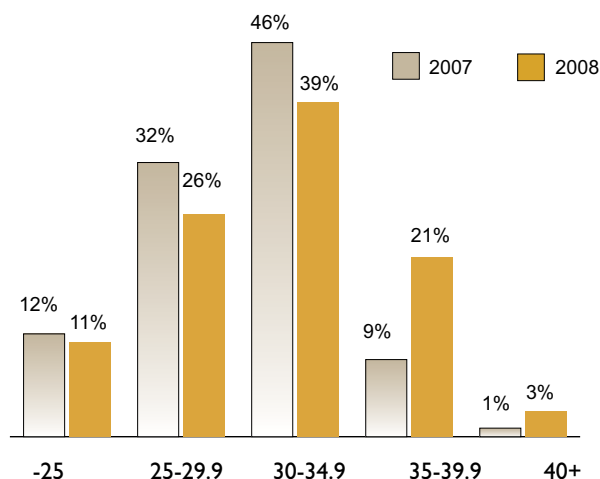


REGIONAL TEST WEIGHT DISTRIBUTION



Eighty-eight percent of 2008 samples have a test weight of 58 lb/bu (76.3 kg/hl) or greater. The regional average test weight is 61.0 lb/bu (80.2 kg/hl), similar to 2007 and the five-year average.

REGIONAL 1000 KERNEL WEIGHT DISTRIBUTION



Sixty-three percent of 2008 samples have a thousand kernel weight of 30 grams or more, higher than 2007. The regional average is 32.6 grams.

Other basic criteria beyond grading factors used to determine wheat's initial value in the marketing system include protein, moisture, dockage, falling number and ash content.

Protein is probably the most important factor in determining the value of hard red spring wheat since it relates to many processing properties. Prices for hard red spring wheat in the U.S. market are usually quoted for 14.0 percent protein (on a 12.0 percent moisture basis). Price premiums or discounts may be specified for halves, fifths and tenths of a percentage point above and below 14.0 percent, depending upon the crop's protein levels and distribution available to the market.

Moisture content is an indicator of grain storability. Wheat with low moisture content is more stable during storage. Moisture content also can be an indicator of profitability in milling.

Dockage is any material easily removed from a wheat sample using standard mechanical means. Dockage removal is the first step in analyzing a sample. All other factors are determined only after dockage is removed.

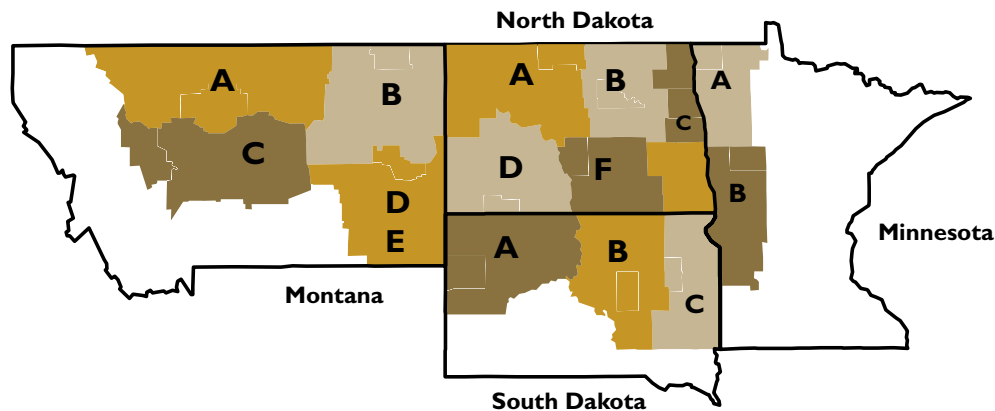
Falling number indicates the soundness of wheat or its alpha-amylase activity. Low falling numbers show high activity associated with sprout damage.

Ash content primarily concentrated in the bran, is an indication of the yield that can be expected in milling white flour.

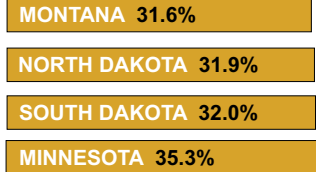
OTHER KERNEL QUALITY DATA

STATE AND CROP REPORTING AREA	Dockage %	Moisture %	1000 Kernel Weight G	Kernel DIST. Medium %	Kernel DIST. Large %	Protein (Dry Matter) %	Protein (12% Moisture) %	Wheat Ash %	Falling Number (SEC)	Zeleny Sedimentation (CC)
MINNESOTA										
Area A	0.3	13.1	35.7	32	66	15.0	13.2	1.48	361	56
Area B	0.8	13.6	34.5	42	55	15.5	13.7	1.59	369	47
State Avg. 2008	0.5	13.3	35.3	35	63	15.2	13.4	1.51	363	53
State Avg. 2007	0.9	13.1	33.1	29	65	15.3	13.5	1.60	442	55
MONTANA										
Area A	0.7	10.8	33.4	57	41	15.5	13.7	1.37	367	56
Area B	0.7	10.6	29.8	70	25	16.8	14.8	1.44	379	59
Area C	1.1	10.0	33.8	54	44	15.7	13.9	1.48	368	53
Area D	0.8	10.6	31.0	60	35	16.3	14.3	1.54	394	56
State Avg. 2008	0.7	10.7	31.6	63	33	16.2	14.2	1.41	374	57
State Avg. 2007	1.1	10.1	27.2	60	23	16.9	14.9	1.65	429	59
NORTH DAKOTA										
Area A	1.1	12.1	30.7	58	37	17.2	15.2	1.48	378	63
Area B	0.6	12.6	33.9	38	60	16.0	14.1	1.56	370	59
Area C	0.9	13.3	36.0	26	73	15.5	13.6	1.47	355	54
Area D	0.8	11.2	25.4	67	13	18.7	16.5	1.78	416	56
Area E	1.1	13.0	32.6	49	49	16.0	14.1	1.62	383	51
Area F	0.8	12.7	33.8	46	53	15.9	14.0	1.57	388	50
State Avg. 2008	0.9	12.4	31.9	48	47	16.6	14.7	1.57	381	57
State Avg. 2007	1.1	12.6	31.3	39	52	16.2	14.2	1.64	422	59
SOUTH DAKOTA										
Area A	0.9	11.3	29.5	67	28	16.1	14.2	1.63	414	46
Area B	1.1	12.4	31.8	56	41	16.2	14.3	1.63	408	45
Area C	0.7	12.5	33.3	44	53	16.3	14.3	1.61	391	48
State Avg. 2008	1.0	12.3	32.0	53	44	16.2	14.3	1.62	403	46
State Avg. 2007	1.1	12.1	31.9	36	57	16.3	14.3	1.73	436	56
FOUR-STATE REGION										
Avg. 2008	0.8	12.4	32.6	48	48	16.2	14.3	1.55	379	55
Avg. 2007	1.0	12.3	31.2	40	51	16.1	14.2	1.60	428	58
Five-Year Avg.	0.9	12.1	30.6	41	51	16.3	14.3	1.6	403	58

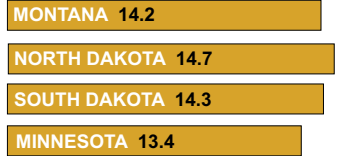
All state and regional averages have been adjusted to reflect production differences.



THOUSAND KERNEL WEIGHT BY STATE

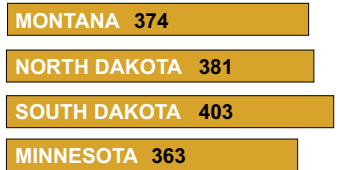


AVERAGE PROTEIN BY STATE



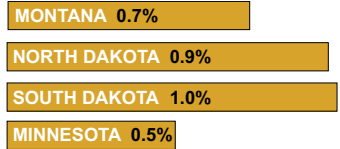
12% MOISTURE BASIS

AVERAGE FALLING NUMBER BY STATE

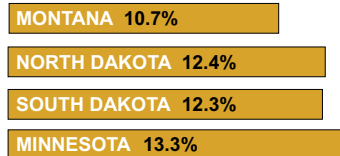


SECONDS

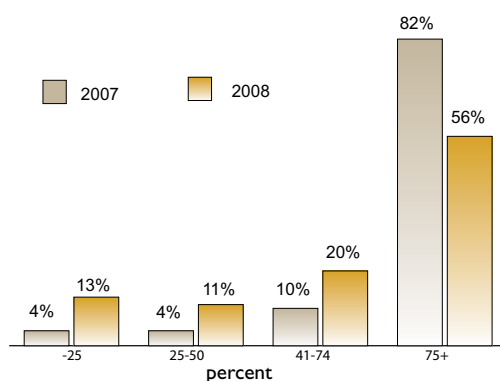
AVERAGE HARVEST DOCKAGE BY STATE



AVERAGE MOISTURE BY STATE

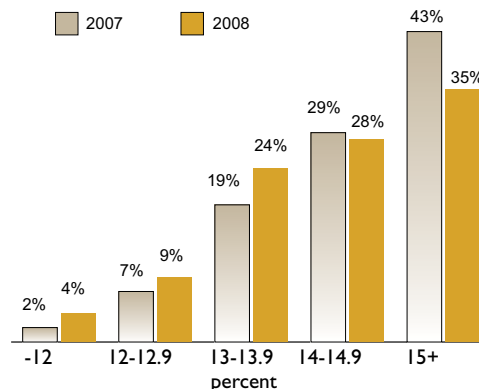


Regional vitreous kernel distribution



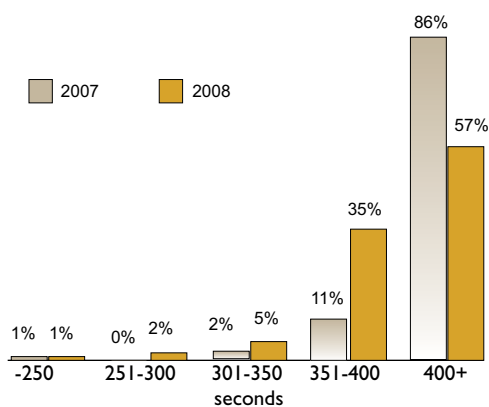
Fifty-six percent of 2008 samples have a dark, hard vitreous kernel count of 75 percent or better.

Regional protein distribution (12% moisture basis)



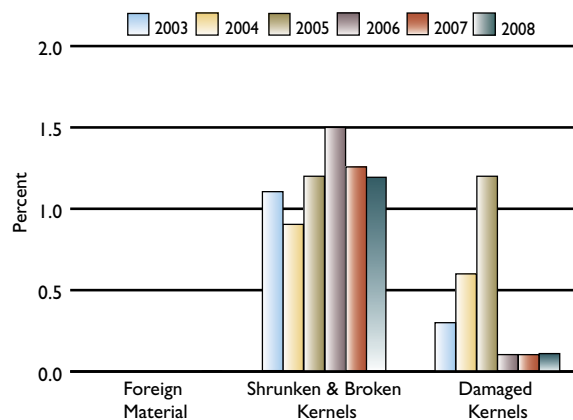
Sixty-three percent of 2008 samples have a protein content of 14.0 percent or greater, down from seventy-two last year.

Regional falling number distribution



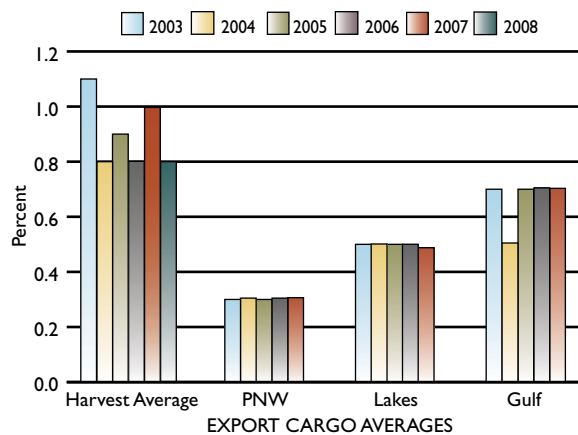
Ninety-two percent of the 2008 crop has a falling number of 350 seconds or greater.

Regional average: total defects



Average total defects are 1.3 percent, a slight decrease from 2007.

Regional average dockage





MILLING CHARACTERISTICS

Flour is evaluated for several factors to determine overall milling efficiency, grade, soundness and functional properties.

Extraction, or the proportion of the wheat kernel that can be milled into flour, is important to mill profitability. For purposes of this survey, test milling was conducted with a Buhler laboratory mill. Results are suitable for comparison between crop years, however yields are lower than those obtained in commercial mills.

Another measure of milling efficiency and of flour grade is the **ash content**, or mineral residue, remaining after incineration of a sample. The lower the ash, the whiter and more refined the flour.

Starch damage measures physical damage to a proportion of the starch granules of flour. The level directly affects water absorption and dough mixing properties.

Wet gluten provides a quantitative measure of the gluten forming proteins in flour that are primarily responsible for its dough mixing and baking properties.

Falling number measures enzyme activity in flour. A fast time indicates high activity, revealing too much sugar and too little starch. Since starch provides bread's supporting structure, too much activity results in sticky dough and poor texture in finished products. Amylograph peak viscosity is another measure of enzyme activity.

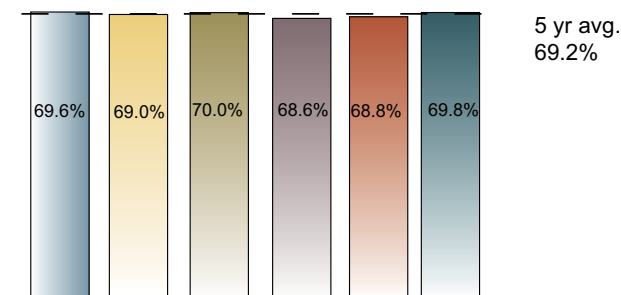
Milling: The 2008 crop samples were milled on a new Buhler laboratory mill, any direct comparisons of extraction, flour ash and starch damage data with the 2007 crop and the five-year average need to be kept in perspective. Internal laboratory testing of the 2008 samples when milled on the old and new Buhler laboratory mills show similar extraction and slightly higher ash with the new mill.

FLOUR QUALITY DATA* (2008 crop milled on new Buhler Laboratory mill)

STATE AND CROP REPORTING AREA	Flour Extraction %	Flour Ash %	Flour Protein (14% Moisture) %	Starch Damage %	Wet Gluten %	Gluten Index %	Falling Number SEC	Amylograph Peak Viscosity 65G FL B.U.	100G FL B.U.
MINNESOTA									
Area A	70.5	0.50	12.3	8.0	32.3	96	368	560	1840
Area B	69.6	0.54	12.7	8.9	33.5	87	410	575	2300
State Avg. 2008	70.3	0.51	12.4	8.3	32.6	93	381	565	1979
State Avg. 2007	69.7	0.48	12.7	7.0	33.7	97	449	690	2619
MONTANA									
Area A	69.7	0.48	13.0	7.5	35.0	88	416	520	2340
Area B	68.7	0.50	13.7	7.5	36.6	91	429	900	3230
Area C	69.9	0.54	13.2	8.4	36.4	78	421	675	2610
Area D	68.2	0.53	13.4	8.0	36.5	87	414	780	3290
State Avg. 2008	69.2	0.49	13.3	7.6	35.9	89	422	718	2809
State Avg. 2007	67.4	0.48	14.2	6.2	38.0	91	494	870	3290
NORTH DAKOTA									
Area A	69.6	0.49	14.1	7.6	37.8	96	384	765	2630
Area B	69.8	0.52	12.9	8.4	34.0	91	373	755	2490
Area C	70.1	0.54	12.9	9.3	33.9	95	362	585	1960
Area D	67.6	0.61	15.4	7.7	40.9	93	448	820	3140
Area E	70.5	0.56	13.2	8.6	34.1	97	388	680	2330
Area F	70.5	0.53	12.9	7.9	34.2	91	390	725	2660
State Avg. 2008	69.6	0.53	13.6	8.2	36.1	94	390	732	2555
State Avg. 2007	68.6	0.49	13.5	6.9	36.1	95	434	683	2533
SOUTH DAKOTA									
Area A	66.3	0.58	13.4	7.8	35.0	88	443	790	3230
Area B	70.8	0.59	13.1	8.0	35.2	90	440	705	2920
Area C	70.8	0.54	13.2	8.4	36.7	89	397	650	2480
State Avg. 2008	70.3	0.57	13.2	8.1	35.6	90	427	695	2810
State Avg. 2007	69.4	0.51	13.5	7.2	37.8	88	470	701	2516
FOUR-STATE REGION									
Avg. 2008	69.8	0.53	13.3	8.1	35.2	92	397	689	2501
Avg. 2007	68.8	0.49	13.4	6.9	36.1	94	449	711	2647
Five-Year Avg.	69.2	0.47	13.2	n/a	35.3	n/a	418	714	2583

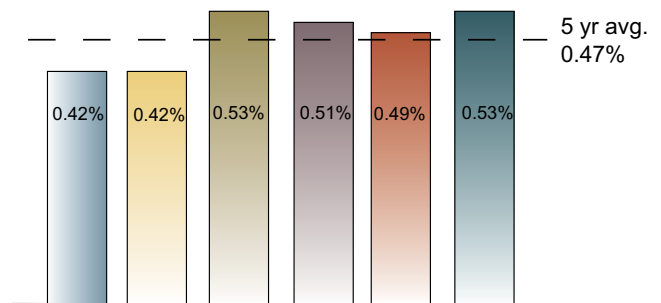
All state and regional averages have been adjusted to reflect production differences.

Regional average: flour extraction

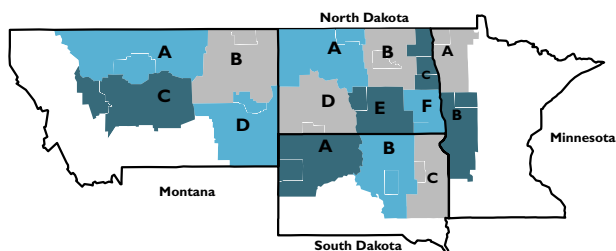


The regional average extraction is 69.8 percent, higher than last year and the five-year average.

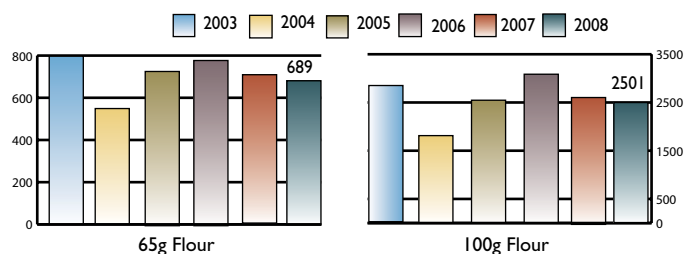
Regional average: ash content



The regional average flour ash is 0.53 percent, higher than last year and the five-year average. The use of a new Buhler lab mill for the 2008 crop accounts for some of the increase.

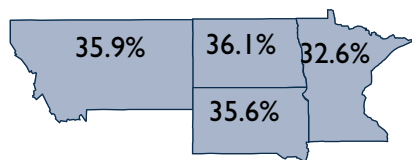


Regional average: amylograph peak viscosity

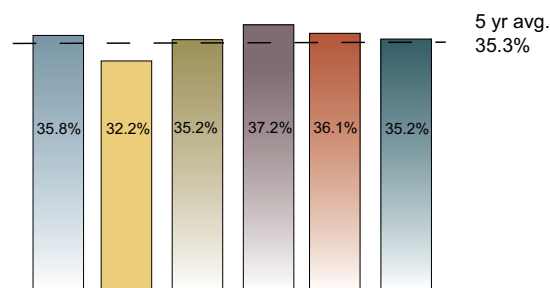


Peak viscosity averages for 2008 are slightly below last year but reflect a very sound crop.

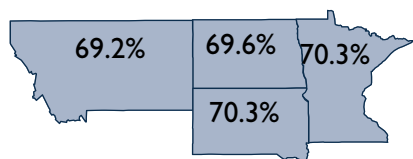
AVERAGE WET GLUTEN BY STATE



Regional average: wet gluten

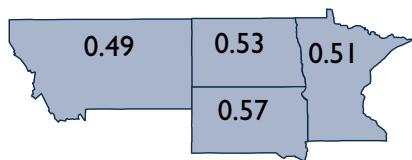


AVERAGE FLOUR EXTRACTION BY STATE

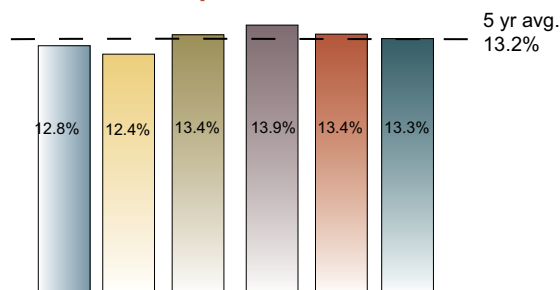


Average wet gluten content for the 2008 crop is 35.2 percent, down slightly from last year.

AVERAGE FLOUR ASH BY STATE



Regional average: flour protein content



The 2008 crop produced an average flour protein content of 13.3 percent, higher than the five-year average.

AVERAGE FLOUR PROTEIN BY STATE



DOUGH CHARACTERISTICS

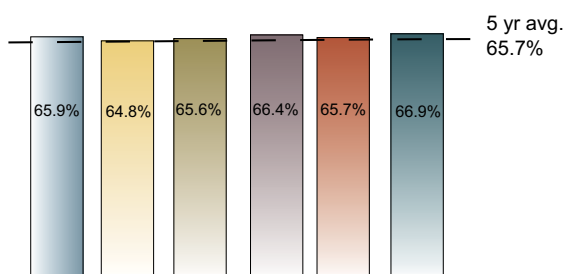
Physical characteristics of dough are evaluated to reveal useful information about variations in flour types, processing requirements and expected end-product quality.

A **farinograph** traces a curve during the dough mixing process to record variations in gluten development and the breakdown of gluten proteins over time. Water absorption indicates the amount of water that can be added to the flour until the dough reaches a definite consistency. Peak time indicates the number of minutes required to achieve this level of dough consistency and mixing tolerance indicates the stability of the dough. Both development time and mixing tolerance are related to dough strength. Farinograms are rated on a scale of 1 to 8, with higher values indicating strong mixing properties.

The **extensigraph** measures dough strength by stretching a piece of dough on a hook until it breaks. The apparatus traces a curve that measures extensibility, resistance to extension and the area beneath the curve, or energy value.

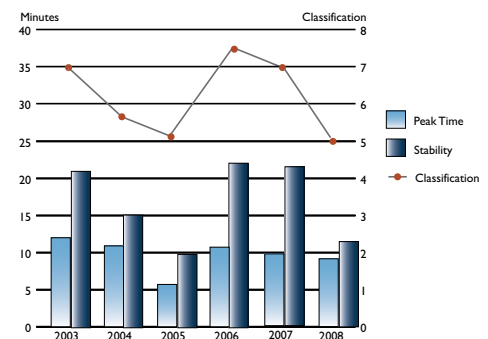
An **alveograph** traces a curve that measures the air pressure necessary to inflate a piece of dough to the point of rupture. The overpressure (P) value reflects the maximum pressure needed to deform the piece of dough during the inflation process and is an indication of resistance, or dough stability. The length (L) measurement reflects dough extensibility. The deformation energy (W) measurement is the amount of energy needed to inflate the dough to the point of rupture and is indicative of dough strength.

Regional average: farinogram absorption



The regional absorption is 66.9 percent, up from 2007 and the five-year average.

Regional average: farinogram results



The regional average peak time is 7.1 minutes; stability, 11.0 minutes; and mixing tolerance index, 34 Brabender units; for an overall classification of 5.0 (on a 1 to 8 scale).

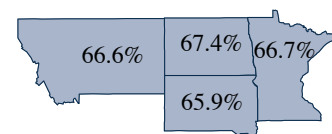
PHYSICAL DOUGH PROPERTIES

FARINOGRAPH

STATE AND CROP REPORTING AREA	Absorption %	Peak Time MIN	Stability MIN	MTI B.U.	Classification	Valorimeter
MINNESOTA						
Area A	66.8	6.0	9.0	40	5	61
Area B	66.4	7.5	9.5	40	5	68
State Avg. 2008	66.7	6.5	9.2	40	5.0	63
State Avg. 2007	64.4	7.7	19.7	20	7.0	72
MONTANA						
Area A	65.9	7.0	11.0	30	5	68
Area B	67.0	7.0	10.0	30	5	68
Area C	67.9	5.0	6.5	30	4	57
Area D	67.6	6.5	9.5	35	5	63
State Avg. 2008	66.6	6.9	10.2	30	4.9	67
State Avg. 2007	64.9	15.9	30.1	15	8.0	89
NORTH DAKOTA						
Area A	66.9	8.5	15.5	20	6	73
Area B	67.0	7.0	13.0	35	5	67
Area C	68.7	6.5	8.0	45	4	62
Area D	67.7	9.0	15.5	20	6	75
Area E	67.2	7.0	9.5	40	5	65
Area F	66.9	7.0	11.5	35	5	67
State Avg. 2008	67.4	7.6	12.7	31	5.2	69
State Avg. 2007	66.3	9.4	22.6	16	7.0	77
SOUTH DAKOTA						
Area A	66.4	7.0	9.0	40	5	66
Area B	66.0	6.5	8.0	40	4	63
Area C	65.8	6.0	8.5	40	4	62
State Avg. 2008	65.9	6.4	8.2	40	4.1	63
State Avg. 2007	65.8	6.7	14.6	28	5.6	68
FOUR-STATE REGION						
Avg. 2008	66.9	7.1	11.0	34	5.0	67
Avg. 2007	65.7	9.6	22.1	18	6.9	76
Five-Year Avg.	65.7	9.8	18.1	22.2	6.4	74

All state and regional averages have been adjusted to reflect production differences.

AVERAGE FARINOGRAM ABSORPTION BY STATE



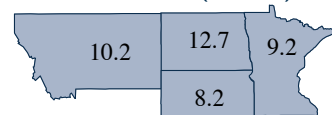
Water required to optimally develop dough.

AVERAGE PEAK TIME BY STATE (MINUTES)



Time to optimal dough development.

AVERAGE STABILITY BY STATE (MINUTES)



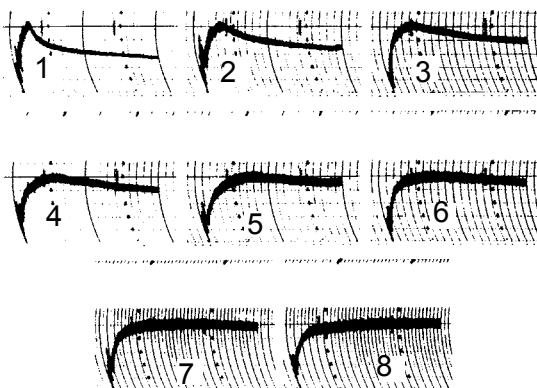
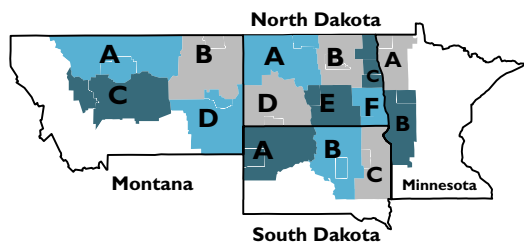
Time to point of dough breakdown.

AVERAGE DOUGH STRENGTH BY STATE

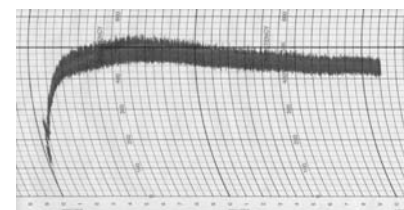


Farinogram classification on a scale of 1 to 8 with higher values indicating strong mixing properties.

REFERENCE FARINOGRAMS FOR HARD RED SPRING WHEAT



REGIONAL AVERAGE FARINOGRAM

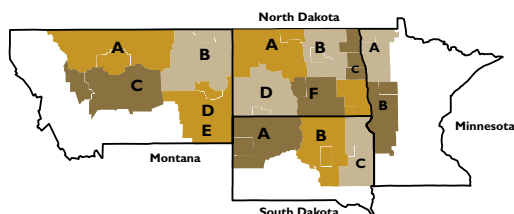


A 5.0 classification indicates medium mixing properties.

PHYSICAL DOUGH PROPERTIES

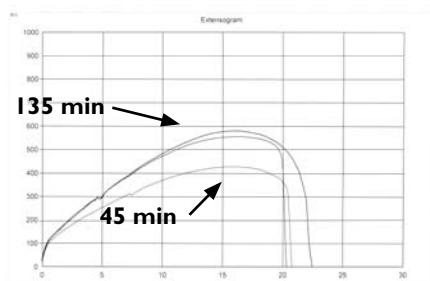
	*EXTENSIGRAPH					ALVEOGRAPH			
	EXTENSIBILITY	RESISTANCE		EXTENSIBILITY	RESISTANCE				
STATE AND CROP	45 MIN	45 MIN	AREA	135 MIN	135 MIN	AREA	P	L	W
REPORTING AREA	cm	B.U.	sq cm	cm	B.U.	sq cm	mm	mm	joulesX10 ⁴
MINNESOTA									
Area A	18.6	420	102	18.7	501	119	110	111	420
Area B	17.9	375	91	18.4	508	123	101	110	353
State Avg. 2008	18.4	406	99	18.6	503	120	107	111	400
State Avg. 2007	17.6	533	118	15.8	741	150	112	103	419
MONTANA									
Area A	20.8	372	104	20.3	517	141	100	121	391
Area B	17.8	452	105	17.9	653	148	109	117	430
Area C	17.1	331	77	18.5	470	116	102	100	321
Area D	18.8	315	82	19.4	461	118	105	111	366
State Avg. 2008	19.1	406	102	19.0	578	142	105	118	405
State Avg. 2007	17.1	497	110	16.1	681	140	108	114	436
NORTH DAKOTA									
Area A	21.2	559	151	23.1	701	212	120	128	561
Area B	20.8	428	119	22.5	580	167	109	109	404
Area C	19.1	362	93	18.0	420	96	119	100	402
Area D	20.5	516	137	20.6	719	193	118	107	461
Area E	18.3	420	105	18.8	609	146	112	100	380
Area F	18.1	367	91	18.7	480	118	106	102	354
State Avg. 2008	20.0	455	121	20.8	599	163	115	110	441
State Avg. 2007	16.6	536	112	16.8	723	156	123	101	454
SOUTH DAKOTA									
Area A	16.6	388	88	16.6	520	112	102	102	340
Area B	16.7	320	75	17.4	415	97	91	107	294
Area C	17.1	277	65	19.1	378	97	84	102	257
State Avg. 2008	16.8	313	73	17.8	413	98	90	105	287
State Avg. 2007	18.3	360	89	17.8	427	101	103	111	359
FOUR-STATE REGION									
Avg. 2008	19.1	418	107	19.7	549	142	108	110	406
Avg. 2007	17.0	508	110	16.7	684	146	116	104	433
Five-Year Avg.	20.5	519	135	n/a	n/a	n/a	113	106	420

All state and regional averages have been adjusted to reflect production differences.

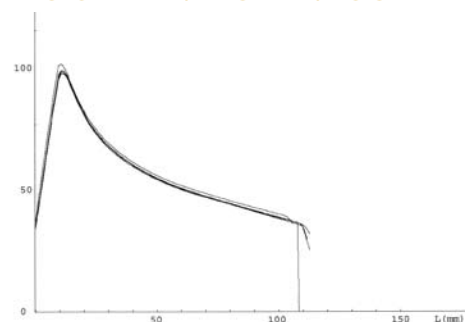


REGIONAL AVERAGE *EXTENSIGRAM

Indicates extensibility and resistance to extension. Area beneath curve indicates the energy or work required.



REGIONAL AVERAGE ALVEOGRAM



P-Curve height shows maximum pressure needed to deform dough, indicating stability. L-Length of curve reflects extensibility. W-Measurement of total energy or work needed to inflate dough.



BAKING CHARACTERISTICS

The gluten strength in flour milled from U.S. hard red spring wheat is essential to supporting the heavy ingredients in many whole grain and artisan breads.

Although consumers make the ultimate judgement, baking tests are the final laboratory method for evaluating wheat quality. In general, a good correlation exists between loaf volume and protein quantity and quality.

Laboratory technicians also visually evaluate test loaves for crumb grain, texture and color, as well as crust color and loaf symmetry.

Above: freshly baked bread waits to cool at NDSU's Baking Laboratory.

Right Top: NDSU's Baking Laboratory

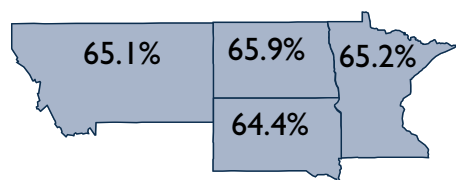
Right Bottom: Researchers at NDSU's Baking Laboratory rely on the same tools found in many bakeries such as these bread pans.



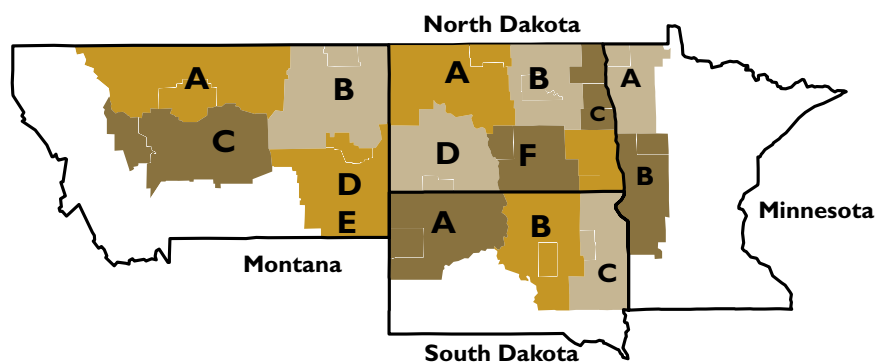
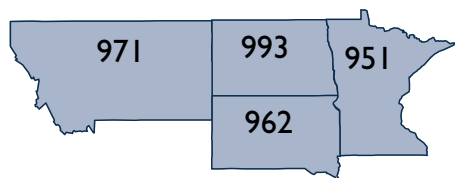
BAKING DATA

STATE AND CROP REPORTING AREA	Baking Absorption %	Dough Handling Properties	Loaf Volume CC	Grain and Texture	Crumb Color	Crust Color	Symmetry
MINNESOTA							
Area A	65.3	10.0	955	9.0	9.0	10.0	9.0
Area B	64.9	10.0	943	8.5	8.5	10.0	9.0
State Avg. 2008	65.2	10.0	951	8.8	8.8	10.0	9.0
State Avg. 2007	62.9	10.0	958	8.0	8.0	10.0	10.0
MONTANA							
Area A	64.4	10.0	955	8.5	8.5	10.0	10.0
Area B	65.5	10.0	995	9.0	9.0	10.0	9.5
Area C	66.4	10.0	903	8.5	8.5	10.0	9.0
Area D	66.1	10.0	925	9.0	8.5	10.0	9.5
State Avg. 2008	65.1	10.0	971	8.8	8.7	10.0	9.7
State Avg. 2007	63.5	10.0	1011	8.2	8.7	10.0	10.0
NORTH DAKOTA							
Area A	65.4	10.0	1023	9.0	9.0	10.0	9.5
Area B	65.5	10.0	975	9.0	9.0	10.0	9.5
Area C	67.2	10.0	978	9.0	8.5	10.0	9.0
Area D	66.2	10.0	1055	9.5	8.5	10.0	10.0
Area E	65.7	10.0	945	8.5	9.0	10.0	9.0
Area F	65.4	10.0	940	9.0	9.0	10.0	9.0
State Avg. 2008	65.9	10.0	993	9.0	8.8	10.0	9.4
State Avg. 2007	64.8	10.0	970	7.8	8.1	10.0	9.9
SOUTH DAKOTA							
Area A	64.9	10.0	950	8.0	8.5	10.0	9.5
Area B	64.5	10.0	965	8.5	9.0	10.0	9.5
Area C	64.3	10.0	963	8.5	9.0	10.0	9.0
State Avg. 2008	64.4	10.0	962	8.4	8.9	10.0	9.3
State Avg. 2007	64.4	10.0	981	8.2	8.2	10.0	9.6
FOUR-STATE REGION							
Avg. 2008	65.4	10.0	977	8.9	8.8	10.0	9.3
Avg. 2007	64.2	10.0	975	7.9	8.2	10.0	9.9
Five-Year Avg.	64.2	9.7	1027	8.0	8.1	10.0	10.0

AVERAGE BAKING ABSORPTION BY STATE

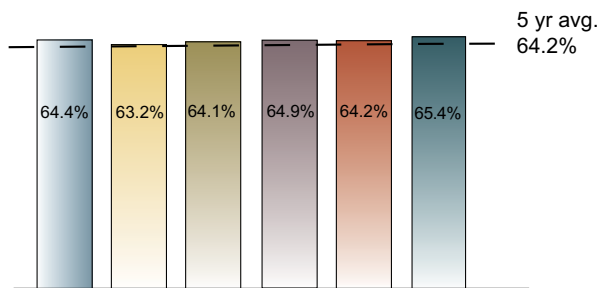


AVERAGE LOAF VOLUME BY STATE



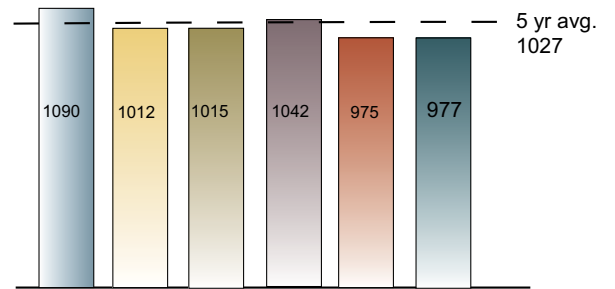


REGIONAL AVERAGE BAKING ABSORPTION



Average absorption for the four-state region is 65.4 percent, above the five-year average.

REGIONAL AVERAGE LOAF VOLUME (cubic centimeters)



Average loaf volume for the four-state region is 977 cubic centimeters, similar to last year.

SUMMARY INFORMATION

AVERAGE QUALITY FACTORS FOR THE REGIONAL HARD RED SPRING WHEAT CROP

	2003	2004	2005	2006	2007	Five-year Average	2008
GRADING AND WHEAT DATA							
Test Weight (lbs/bu)	61.5	61.1	60.2	60.6	61.1	60.9	61.0
Test Weight (kg/hl)	80.8	80.4	79.1	79.7	80.4	80.1	80.2
Vitreous Kernels (%)	82	65	68	82	79	75	71
1000 Kernel Weight (gm)	30.4	32.9	29.8	28.9	31.2	30.6	32.6
Protein: 12% moisture (%)	14	13.8	14.6	15.0	14.2	14.3	14.3
Protein: dry (%)	16	15.6	16.5	17.1	16.1	16.3	16.2
Ash: 14% moisture (%)	1.59	1.55	1.72	1.53	1.60	1.6	1.55
Falling Number (sec)	403	355	414	416	428	403	379
FLOUR DATA							
Flour Extraction (%)	69.6	69.0	70.0	68.6	68.8	69.2	69.8
Ash: 14% moisture (%)	0.42	0.42	0.53	0.51	0.50	0.47	0.53
Protein: 14% moisture (%)	12.8	12.4	13.4	13.9	13.4	13.2	13.3
Wet Gluten (%)	35.8	32.2	35.2	37.2	36.1	35.3	35.2
Falling Number (sec)	421	365	418	436	449	418	397
Amylography Peak Viscosity							
65g FL (B.U.)	797	549	731	783	711	714	689
100g FL (B.U.)	2824	1813	2547	3086	2647	2583	2501
PHYSICAL DOUGH PROPERTIES							
Farinograph:							
Absorption (%)	65.9	64.8	65.6	66.4	65.7	65.7	66.9
Peak Time (min)	12.0	10.9	5.7	10.8	9.6	9.8	7.1
Stability (min)	21.1	15.2	9.9	22.4	22.1	18.1	11.0
Classification	6.9	5.6	5.1	7.5	6.9	6.4	5.0
	(strong)	(med)	(med)	(strong)	(strong)	(strong)	(med)
Extensigraph:							
Extensibility-45 min (cm)	23.6	20.1	21.0	20.7	17.0	20.1	19.1
Resistance-45 min (B.U.)	519	564	458	544	433	519	418
Area-45 min (sq cm)	153	144	125	143	110	135	107
Alveograph:							
P (mm)	96	124	112	116	116	113	108
L (mm)	116	103	102	106	104	106	110
W (Joules X 10 ⁶)	386	446	382	453	433	420	406
BAKING DATA:							
Absorption (%)	64.4	63.2	64.1	64.9	64.2	64.2	65.4
Dough Handling Properties	10.0	10.0	8.5	10.0	10.0	9.7	10.0
Loaf Volume (cc)	1090	1012	1015	1042	975	1027	977
Grain and Texture	8.4	7.9	7.7	8.0	7.9	8.0	8.9
Crumb Color	8.4	8.0	8.0	7.7	8.2	8.1	8.8
Crust Color	10.0	10.0	10.0	10.0	10.0	10.0	10.0
Symmetry	10.0	9.8	10.0	10.0	9.9	9.9	9.3

2008 REGIONAL QUALITY FACTORS BY PROTEIN RANGE

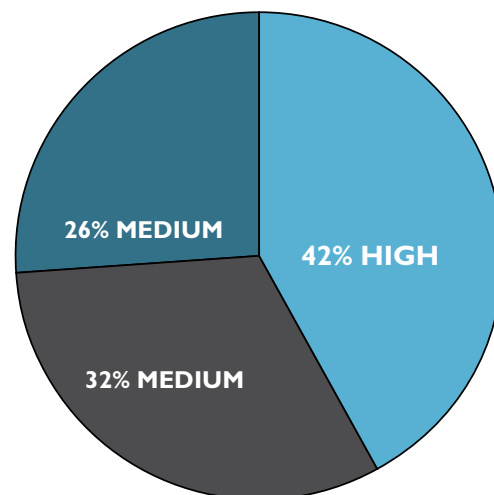
Production %	Protein Ranges				Protein Ranges		
	Low 26	Medium 32	High 42		Low 26	Medium 32	High 42
WHEAT GRADING DATA				DOUGH PROPERTIES			
Test Weight (lb/bu)	61.7	61.7	59.6	Farinograph:			
Test Weight (kg/hl)	81.1	81.2	78.5	Peak Time (min)	5.4	7.0	7.8
Damage (%)	0.1	0.2	0.1	Stability (min)	9.3	9.8	13.2
Foreign Material (%)	0.0	0.0	0.0	Absorption (%)	65.3	66.9	67.6
Shrunken/Broken (%)	1.0	0.9	2.0	Classification	4.3	5.0	5.6
Total Defects (%)	1.1	1.1	2.1	Alveograph:			
Vitreous Kernels (%)	54	64	78	P (mm)	108	106	111
Grade	1 NS	1 NS	1 DNS	L (mm)	100	119	127
WHEAT DATA				W (erg/gm)	356	407	471
Dockage (%)	0.5	0.5	0.8	P/L ratio	1.09	0.90	0.87
Moisture (%)	12.3	12.2	11.4	Extensigraph:			
Protein: 12% moisture (%)	12.6	14.0	15.7	Resistance-45 min (BU)	408	413	461
Protein: dry basis (%)	14.3	15.9	17.8	Extension-45 min (cm)	17.7	19.2	19.2
1000 Kernel Wt. (gm)	34.2	34.1	32.8	Area-45 min (sq cm)	971	107	116
Ash: 14% moisture (%)	1.56	1.50	1.55	Resistance-135 min (BU)	545	533	672
Falling Number (sec)	376	350	404	Extension-135 min (cm)	16.7	18.1	19.8
Sedimentation (cc)				Area-135 min (sq cm)	117	126	171
FLOUR DATA				BAKING EVALUATION:			
Extraction (%)	69.4	69.5	68.8	Absorption (%)	63.8	65.4	66.1
Protein: 14% moisture (%)	11.5	13.0	14.7	Loaf volume (cc)	909	958	1045
Protein: dry basis (%)	13.3	15.1	17.1	Crumb Grain/Texture	8.5	8.8	8.8
Ash: 14% moisture (%)	0.51	0.49	0.53				
Ash: dry basis (%)	0.59	0.57	0.62				
Wet Gluten (%)	29.7	34.5	39.8				
Gluten Index (%)	96.4	89.7	90.3				
Falling Number (sec)	390	377	400				
Amylograph Viscosity:							
65g FL (B.U.)	640	599	723				
100g FL (B.U.)	2414	2102	2590				

Performance characteristics often improve as buyers increase their protein specifications. To illustrate the correlation between higher protein and other quality parameters, samples of the regional crop were segregated by protein levels (all based on 12 percent moisture content):

- low (less than 13.5 percent),
- medium (13.5 percent to 14.5 percent), and
- high (more than 14.5 percent).

As protein content increased in the 2008 crop, wet gluten, absorption, mix stability and loaf volume all improved.

REGIONAL AVERAGE: PRODUCTION DISTRIBUTION BY PROTEIN RANGE





EXPORT CARGO SAMPLING

Data contained in previous sections of this report are derived from the testing of samples gathered during harvest from origination points throughout the U.S. hard red spring wheat region. The results provide an assessment of the overall quality of the crop produced in a given year.

U.S. Wheat Associates, the export market development arm for American wheat growers, furthers this information by commissioning an export cargo sampling program. The program provides an accurate representation of the supplies moving through the grain marketing and transportation system and actually reaching export points. Results show the quality levels at which U.S. wheat is realistically traded and are useful to customers in developing reasonable purchase specifications.

The Federal Grain Inspection Service oversees the program whereby all export inspection agencies at all ports collect every tenth subplot sample from every vessel of U.S. wheat shipped during three two-month time periods annually.

The hard red spring wheat samples are sent to the North Dakota State University Plant Science Department's Hard Red Spring Wheat Quality Laboratory for analysis. Average results for the past two years are at right, through the grain marketing and transportation system and actually reaching export points. Results show the quality levels at which U.S. wheat is realistically traded and are useful to customers in developing reasonable purchase specifications.

EXPORT CARGO DATA

	PNW AVERAGE		GREAT LAKES AVERAGE		GULF AVERAGE	
	2006	2007	2006	2007	2006	2007
SAMPLE COUNT	176	107	33	21	45	31
GRADING DATA						
Test Weight (lbs/bu)	61.0	61.2	62.0	61.8	61.1	61.2
Test Weight (kg/hl)	80.3	80.5	81.5	81.3	80.3	80.5
Damaged Kernels (%)	0.3	0.2	1.4	1.2	1.2	1.6
Foreign Material (%)	0.1	0.1	0.1	0.1	0.2	0.2
Shrunken & Broken (%)	1.7	1.7	1.1	1.2	1.4	1.2
Total Defects (%)	2.1	2.0	2.6	2.6	2.8	3.0
Vitreous Kernels (%)	84	82	59	54	63	55
Grade	IDNS	IDNS	INS	INS	INS	INS
OTHER WHEAT DATA						
Dockage (%)	0.3	0.3	0.5	0.5	0.7	0.7
Moisture (%)	10.8	11.2	12.3	12.1	12.1	12.6
Protein: 12% Moisture (%)	14.4	14.4	14.3	14.3	14.4	14.2
Protein: Dry (%)	16.4	16.4	16.3	16.2	16.3	16.1
Ash: 14% Moisture (%)	1.53	1.60	1.53	1.64	1.55	1.66
Ash: Dry (%)	1.78	1.87	1.78	1.91	1.80	1.93
1000 Kernel Weight (g)	31.3	30.4	32.5	31.2	31.9	31.7
Kernel Size (%) lg/md/sm	42/48/9	14/64/28	55/41/5	36/54/11	50/43/7	27/50/26
Single Kernel: Hardness	81.0	79.3	82.1	81.5	80.5	78.9
Weight (mg.)	29.3	29.2	30.1	29.1	29.9	30.0
Diameter (mm)	2.38	2.37	2.44	2.41	2.42	2.43
Falling Number (sec)	455	438	426	418	460	396
FLOUR DATA						
Flour Extraction (%)	69.2	68.7	69.4	68.4	69.7	69.0
Color: L (white-black)	91.0	90.9	90.8	90.9	90.7	90.7
a (red-green)	-1.3	-1.1	-1.4	-1.4	-1.3	-1.2
b (yellow-blue)	8.8	9.0	9.2	9.1	9.2	9.2
Protein: 14% Moisture (%)	13.3	13.3	13.1	13.1	13.3	12.9
Protein: Dry (%)	15.4	15.5	15.3	15.2	15.4	15.0
Ash: 14% Moisture (%)	0.49	0.50	0.49	0.49	0.51	0.51
Ash: Dry (%)	0.57	0.58	0.57	0.57	0.59	0.59
Wet Gluten (%)	34.3	35.4	34.1	34.8	34.3	34.7
Gluten Index (%)	94	89	92	92	94	90
Falling Number (sec)	502	460	461	436	491	417
Amylograph Peak Viscosity						
65g FL (B.U.)	832	824	703	723	767	592
PHYSICAL DOUGH DATA:						
Farinograph:						
Absorption (%)	64.6	64.7	64.3	65.2	63.9	64.3
Peak Time (min)	9.8	9.1	8.7	8.3	8.3	8.2
Stability (min)	21.8	20.9	17.2	18.7	17.1	16.9
Classification						
Alveograph:						
P (mm)	107	114	98	119	99	109
L (mm)	114	104	118	99	117	106
W (Joules X 10 ⁻⁴)	433	424	404	431	400	405
BAKING DATA:						
Absorption (%)	63.1	65.1	62.8	65.9	62.4	64.6
Loaf Volume (cc)	968	951	966	945	955	944
Crumb Grain and Texture	8.3	9.2	8.2	9.1	8.3	9.0



LABORATORY ANALYSIS

All quality data contained in this report are the result of testing and analysis conducted by or under the supervision of Dr. Senay Simsek, Wheat Quality Specialist, and Brent Hinsz, R. Olson, and K. McMonagle, food technologists with the Hard Red Spring Wheat Quality Laboratory in the Department of Plant Science at North Dakota State University, Fargo, USA.

COLLECTION • The North Dakota, South Dakota, Montana and Minnesota state offices of the National Agricultural Statistics Service obtained wheat samples during harvest directly from growers, farm bins and local elevators. These samples reflect the condition of the grain at the point of origin. Collection began in early August when approximately 10 to 15 percent of the hard red spring wheat had been harvested and continued until mid September when about 95 percent of the region's crop was harvested.

Sample collection was weighted by county production histories with a total of 809 samples being collected during harvest from Minnesota (102), Montana (191), North Dakota (389), and South Dakota (127).

ANALYSIS • Approximately 40 percent of the total wheat samples collected were analyzed for grade and other physical kernel characteristics. Distributions as a percentage of the harvested crop were calculated for key factors including test weight, thousand kernel weight, protein, falling number, and overall grade. Distribution results may differ from data presented in the various tables, because the latter are derived from production adjusted averages, rather than simple averages.

Quality tests, including milling, flour evaluation, physical dough and bread properties, were conducted on composite samples representing each crop reporting area. Again, all state and regional averages have been adjusted to reflect production as opposed to simple averaging.

METHODS, TERMS, SYMBOLS

WHEAT

SAMPLE COLLECTION • Each sample contained approximately 2 to 3 pounds of wheat, stored in sealed, moisture proof plastic bags.

MOISTURE • Official USDA procedure using Motomco Moisture Meter.

GRADE • Official United States Standards for Grain, as determined by a licensed grain inspector. North Dakota Grain Inspection Service, Fargo, ND, provided grades for composite wheat samples representing each crop reporting area.

VITREOUS KERNELS • Approximate percentage of kernels having vitreous endosperm.

DOCKAGE • Official USDA procedure. All matter other than wheat which can be removed readily from a test portion of the original sample by use of an approved device (Carter Dockage Tester). Dockage may also include underdeveloped, shriveled and small pieces of wheat kernels removed in properly separating the material other than wheat and which cannot be recovered by properly rescreening or recleaning.

TEST WEIGHT • American Association of Cereal Chemists Method 55-10 approved April 1961, revised October 1999. Measured as pounds per bushel (lb/bu), kilograms per hectoliter (kg/hl) = (lbs/bu X 1.292) + 1.419. *Approved Methods of the American Association of Cereal Chemists, Cereal Laboratory Methods (10th Edition), St. Paul, MN (2000).

THOUSAND KERNEL WEIGHT • Based on 10 gram sample of cleaned wheat (free of foreign material and broken kernels) counted by electronic seed counter.

KERNEL SIZE DISTRIBUTION • Percentages of the size of kernels (large, medium, small) were determined using a wheat sizer equipped with the following sieve openings:

- top sieve—Tyler #7 with 2.92 mm opening;
- middle sieve—Tyler #9 with 2.24 mm opening; and
- bottom sieve—Tyler #12 with 1.65 mm opening.

PROTEIN • American Association of Cereal Chemists (AAC) Method: 46-30 (Combustion Method), expressed on dry basis and 12 percent moisture basis.

ASH • American Association of Cereal Chemists Method 08-01, approved April 1961, revised October 1999; expressed on a 14 percent moisture basis.

FALLING NUMBER • American Association of Cereal Chemists Method 56-81B, approved November 1972, revised September 1999; units of seconds (14 percent moisture basis).

SEDIMENTATION • American Association of Cereal Chemists Method 56-61A, expressed in centimeters. Approved Methods of the American Association of Cereal Chemists, (8th Edition), St. Paul, MN (1983).

FLOUR

EXTRACTION • Thoroughly cleaned wheat is tempered to 15.5 percent moisture for 16 hours and an additional 0.5 percent water is added five minutes prior to milling. The milling laboratory is controlled at 68 percent relative humidity and 72°F to 74°F. Milling is performed on a Buhler laboratory mill (Type MLU-202). Straight grade flour (of all six flour streams) is blended and reported as “flour extraction.” The blended flour is rebolted through an 84 SS sieve to remove any foreign material. This product is used for the other flour quality determinations.

ASH • American Association of Cereal Chemists Method 08-01, approved April 1961, revised October 1999; expressed on a 14 percent moisture basis.

PROTEIN • American Association of Cereal Chemists (AACC) Method 46-30 (Combustion Method), expressed on a 14 percent moisture basis.

WET GLUTEN • American Association of Cereal Chemists Method 38-12, approved October 1999; expressed on a 14 percent moisture basis determined with the glutomatic instrument.

GLUTEN INDEX • American Association of Cereal Chemists Method 38-12, approved October 1999; determined with the glutomatic instrument as an indication of gluten strength.

FLOUR FALLING NUMBER • American Association of Cereal Chemists Method 56-81B, approved November 1972, revised September 1992; units of seconds. Determination is performed on 7.0 g of Buhler milled flour (14 percent moisture basis).

AMYLOGRAM • (100 g) American Association of Cereal Chemists Method 22-10. Peak viscosity reported in Brabender units (B.U.), on a 14 percent moisture basis.

(65 g) American Association of Cereal Chemists Method 22-10, modified as follows: 65 g of flour (14 percent moisture basis) are slurried in 450 ml distilled water; paddle stirrers are used with the Brabender Amylograph. Peak viscosity reported in Brabender units (B.U.), on a 14 percent moisture basis.

STARCH DAMAGE • American Association of Cereal Chemists Method 76-31. Proportion of starch granules that have incurred physical damage from milling.

PHYSICAL

DOUGH PROPERTIES

FARINOGRAM • American Association of Cereal Chemists Method 54-21; constant flour weight method, small (50 g) mixing bowl. (Flour weight 14 percent moisture basis)

ABSORPTION • Amount of water required to center curve peak on the 500 Brabender unit line, expressed on 14 percent moisture basis.

PEAK TIME • The interval, to the nearest 0.5 min, from the first addition of water to the maximum consistency immediately prior to the first indication of weakening. Also known as dough development time.

STABILITY • The time interval, to the nearest 0.5 min, between the point where the top of the curve that first intersects the 500-BU line and the point where the top of the curve departs the 500-BU line.

MIXING TOLERANCE INDEX • The difference, in Brabender units, from the top of the curve at the peak to the top of the curve measured five minutes after the peak.

VALORIMETER VALUE • An empirical, single-figure quality score based on the development time and tolerance to mixing. Derived from the farinogram by means of a special template supplied by the equipment manufacturer. Generally, stronger flours have higher valorimeter values.

CLASSIFICATION • An empirical classification incorporating peak time, stability, MTI, and general curve characteristics. A scale of 1 to 8 is employed with higher values indicating stronger curve types.

EXTENSIGRAM • American Association of Cereal Chemists Method 54-10, approved April 1961, revised October 1982; modified as follows: (a) 100 grams of flour (14 percent moisture basis), 2.0 percent sodium chloride (U.S.P.) and water (equal to farinograph absorption minus 2 percent) are mixed to optimum development in a National pin dough mixer; (b) doughs are scaled to 150 grams, rounded, moulded, placed in extensigram holders, and rested for 45 minutes and 135 minutes, respectively, at 30°C and 78 percent relative humidity. The dough is then stretched as described in the procedure referenced above. For conversion purposes, 500 grams equals 400 B.U.

EXTENSIBILITY • Total length of the curve at the base line in centimeters.

RESISTANCE • Maximum curve height, reported in Brabender units (B.U.).

AREA • The area under the curve is measured and reported in square centimeters.

ALVEOGRAPH • International Association of Cereal Chemists Standard No. 121. Measurement of dough extensibility and resistance to extension.

“P” • Maximal overpressure; related to dough’s resistance to deformation.

“L” • Dough extensibility.

“W” • The “work” associated with dough deformation.

BAKING

PROCEDURE • American Association of Cereal Chemists Method 10-09, approved September 1985; modified as follows: (a) fungal amylase (SKB 15) replacing malt dry powder; (b) instant dry yeast (1 percent) in lieu of compressed yeast; (c) 5 to 10 ppm ammonium phosphate, where added oxidants are required; (d) 2 percent shortening added. Doughs are mechanically punched using 6-inch rolls, and mechanically moulded using a National “Roll-R-Up” moulder. Baking is accomplished in “Shogren-type” pans.

BAKING ABSORPTION • Water required for optimum dough baking performance, expressed as a percent of flour weight on a 14 percent moisture basis.

DOUGH CHARACTER • Handling characteristics assessed at panning on a scale of 1 to 10 with higher scores preferred.

LOAF VOLUME • Rapeseed displacement measurement made 30 minutes after bread is removed from the oven.

CRUMB GRAIN AND TEXTURE • Visual comparison to standard using a constant illumination source. Scale of 1 to 10, the higher scores preferred.

CRUMB COLOR • Visual comparison with a standard using a constant illumination source on a scale of 1 to 10, the higher scores preferred.

CRUST COLOR • Visual comparison with a standard using a constant illumination source on a scale of 1 to 10, the higher scores preferred.

SYMMETRY • Visual comparison with a standard using a constant illumination source on a scale of 1 to 10, the higher scores preferred.

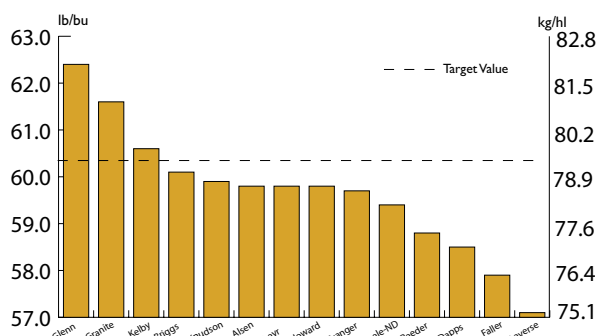
VARIETAL INFORMATION

Quality products begin with quality ingredients. In wheat, quality begins with the varieties planted. Within the hard red spring class of wheat, there are different varieties available — all with relatively uniform characteristics.

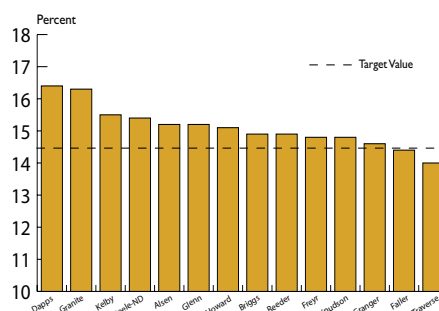
Spring wheat variety development is carried out through public breeding programs at North Dakota State University in Fargo, the University of Minnesota in St. Paul, South Dakota State University in Brookings, and Montana State University in Bozeman. Public plant breeders test varieties for performance at experiment stations across the region. Private firms also develop spring wheat varieties for the region. The two primary ones are AgriPro and Westbred.

Before any spring wheat variety is released for commercial production, it must meet or exceed current standards for the class. Prospective variety releases are evaluated for milling and baking characteristics as well as for yield, protein content, test weight, resistance to diseases and insects, and straw strength.

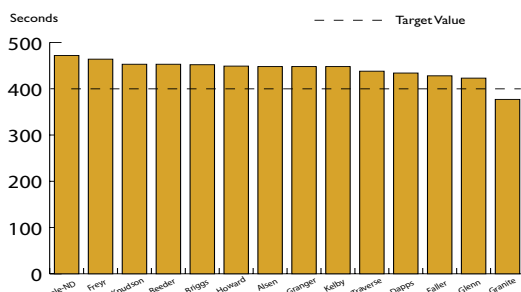
TEST WEIGHT COMPARISON



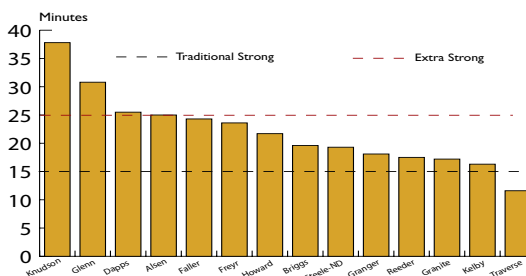
WHEAT PROTEIN CONTENT COMPARISON (12% MOISTURE BASIS)



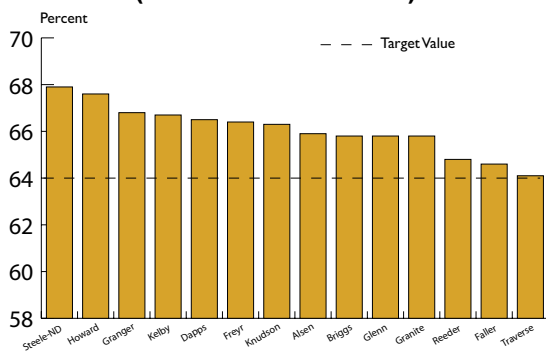
WHEAT FALLING NUMBER



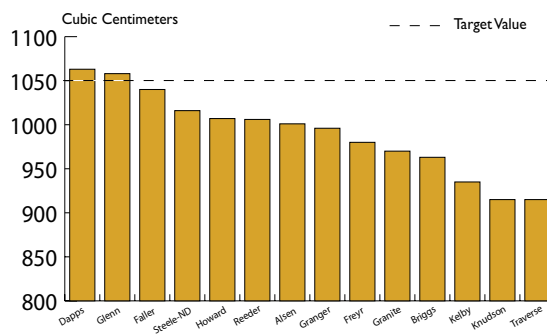
FARINOGRAPH STABILITY



FARINOGRAPH ABSORPTION COMPARISON (14% MOISTURE BASIS)



LOAF VOLUME COMPARISON



Target values represent regionally agreed upon goals of public and private variety development programs.

Environment influences the quality of varieties across growing areas and planting years. For this reason, wheat breeders use “check” or reference varieties to evaluate quality in experimental varieties. They usually test and analyze quality data from multiple years and growing locations before a variety is released.



VARIETAL INFORMATION

Grown & Tested across North Dakota • Agronomic Factors

	Agent or Origin ¹	Year Released	Agronomic Description		Reaction to Disease ²			Average Yield			
			Straw Strength	Maturity	Leaf Rust	Foliar Disease	Head (Scab)	Eastern North Dakota ³		Western North Dakota ⁴	
								BU/Acre	MT/HA	BU/Acre	MT/HA
Alsen	ND	2000	strg.	m. early	MR	S	MR	70.1	4.71	38.2	2.57
Briggs	SD	2002	med.	m. early	R	MS	S	73.3	4.93	36.9	2.48
Dapps	ND	2003	med.	m.early	R	M	MS	71.0	4.77	n/a	n/a
Faller	ND	2006	strg.	med.	R	MR	MR	80.4	5.41	33.2	2.23
Freyr	AgriPro	2004	strg.	med.	MR	MS	MR	71.3	4.79	38.8	2.61
Glenn	ND	2005	strg.	m. early	R	M	MR	73.1	4.91	36.8	2.47
Granger	SD	2004	m. strg.	m. early	R	MS	MS	74.3	5.00	37.0	2.49
Granite	Westbred	2002	v. strg.	m. late	MR	S	MS	70.9	4.77	38.3	2.57
Howard	ND	2006	strg.	med.	R	M	M	77.1	5.18	35.9	2.41
Kelby	AgriPro	2006	strg.	med.	R	M	MR	73.0	4.91	42.1	2.83
Knudson	AgriPro	2001	strg.	med.	MR	MR	M	76.2	5.12	38.5	2.59
Kuntz	AgriPro	2007	strg.	m.early	MR	MS	n/a	75.7	5.09	38.1	2.56
RB07	MN	2007	m.strg.	m.early	R	MS	n/a	77.1	5.18	43.2	2.90
Reeder	ND	1999	strg.	m.early	MS	S	S	73.6	4.95	36.4	2.45
Steele-ND	ND	2004	med.	med.	R	MS	M	70.8	4.76	39.2	2.64
Traverse	SD	2006	med.	m. early	MR	MS	MR	80.3	5.40	35.9	2.41

Grown & Tested in Williston/Dickinson, North Dakota • Agronomic Factors

	Agent or Origin ¹	Year Released	Agronomic Description		Reaction to Disease ²			Average Yield	
			Straw Strength	Maturity	Leaf Rust	Foliar Disease	Head (Scab)	Williston & Dickinson, North Dakota	
								BU/Acre	MT/HA
Choteau	MT	2004	n/a	m.early	n/a	n/a	n/a	35.4	2.38
Freyr	AgriPro	2004	strg.	med.	MR	MS	MR	34.3	2.31
Glenn	ND	2005	strg.	m.early	R	M	MR	34.4	2.31
Reeder	ND	1999	strg.	m.early	MS	S	S	35.5	2.39
Steele-ND	ND	2004	med.	med.	R	MS	M	34.8	2.34

¹ ND=North Dakota State University (Public), SD=South Dakota State University (Public), MN=University of Minnesota (Public), MT=Montana State University (Public), AgriPro (Private), WPB=Westbred (Private)

² Reaction to Disease: resistant (R), moderately resistant (MR), intermediate (M), moderately susceptible (MS), susceptible (S), very susceptible (VS). *Indicates yield and/or quality have often been higher than would be expected based on visual head blight symptoms alone.

³ 2008 North Dakota average yield data from Prosper, Carrington, Cassleton and Langdon locations in North Dakota.

⁴ 2008 North Dakota average yield data from Williston, Dickinson and Hettinger locations in North Dakota.

Source: NDSU Plant Science Department, Hard Red Spring Wheat Quality Laboratory, average of 2006-2007 field plot trials at six locations.



Grown & Tested across North Dakota • Quality & End-Use Factors

Variety	Quality Factors ⁵						End-Use ⁷		
	Test Weight LB/BU	Test Weight KG/HL	Wheat Protein %	Wheat Falling # Seconds	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Gluten Strength Description ⁷	Mill & Bake Quality Rating ⁸
Alsen	59.8	78.7	15.2	448	25.0	65.9	1001	traditional strong	★★★★
Briggs	60.1	79.1	14.9	452	19.6	65.8	963	mellow	★★★
Dapps	58.5	77.0	16.4	434	25.5	66.5	1063	traditional strong	★★★★
Faller	57.9	76.2	14.4	428	24.3	64.6	1040	traditional strong	★★★
Freyr	59.8	78.7	14.8	464	23.6	66.4	980	traditional strong	★★★
Glenn	62.4	82.0	15.2	423	30.8	65.8	1058	traditional strong	★★★★★
Granger	59.7	78.6	14.6	448	18.1	66.8	996	traditional strong	★★★
Granite	61.6	81.0	16.3	377	17.2	65.8	970	traditional strong	★★★
Howard	59.8	78.7	15.1	449	21.7	67.6	1007	traditional strong	★★★
Kelby	60.6	79.7	15.5	448	16.3	66.7	935	mellow	★★★
Knudson	59.9	78.8	14.8	453	37.8	66.3	915	extra strong	★★★
Reeder	58.8	77.4	14.9	453	17.5	64.8	1006	mellow	★★★
Steele-ND	59.4	78.2	15.4	472	19.3	67.9	1016	traditional strong	★★★★
Traverse	57.1	75.2	14.0	438	11.6	64.1	915	mellow	★

Grown & Tested in Dickinson/Willison , North Dakota • Quality & End-use Factors

	Quality Factors ⁶						End Use ⁷		
	Test Weight LB/BU	Test Weight KG/HL	Wheat Protein %	Wheat Falling # Seconds	Farinogram Stability (Min)	Absorption %	Loaf Volume CC	Gluten Strength Description ⁷	Mill & Bake Quality Rating ⁸
Choteau	58.9	77.5	15.4	449	29.0	65.1	984	traditional strong	★★★
Freyr	59.1	77.8	15.1	448	26.8	66.3	976	traditional strong	★★★
Glenn	61.2	80.5	15.5	429	33.9	65.3	1120	traditional strong	★★★★★
Reeder	58.4	76.9	15.9	470	21.3	66.1	1033	mellow	★★★
Steele-ND	58.0	76.4	15.4	491	25.3	68.	1056	traditional strong	★★★★

⁵ Source: NDSU Plant Science Department, Hard Red Spring Wheat Quality Laboratory, multi-year analysis of field plot trials in multiple locations across North Dakota.

⁶ Willison and Dickinson, ND only.

⁷ Traditional Strong—functionality characteristic of hard red spring wheat; relatively quick mixing time, long mixing stability and tolerance to over-mixing.

Extra Strong—stronger than traditional hard red spring wheat varieties; longer mixing time and very long mixing stability.

Mellow—weaker than “traditional strong” varieties; shorter mixing time and stability.

⁸ Mill and bake quality rating based on protein content, milling performance, flour attributes, dough characteristics and baking performance.

Five stars = superior, four stars = excellent, three stars = good, two stars = average, one star = poor. Based on limited testing for end-use score.

NORTH DAKOTA

The North Dakota Agricultural Statistics Service reports leading varieties in 2008 are Glenn, Steele-ND, Freyr, Briggs and Alsen. Of the 6.8 million acres of spring wheat planted in North Dakota, the top five varieties account for 61 percent.

GLENN continues to dominate North Dakota spring wheat area with nearly 28 percent of the acres in 2008, and it is the third most popular in Minnesota. Glenn remains popular for its combination of resistance to Fusarium headblight and leaf rust, and a competitive yield. It has superior milling and baking qualities and is the industry standard for quality in public and private breeding programs.

STEELE-ND ranks second in North Dakota and third in South Dakota. It tends to be more popular in western production districts where its higher levels of resistance to leaf rust and leaf diseases, along with higher yields are finding increasing favor with producers and is replacing the variety Reeder. It is rated as having excellent milling and baking qualities.

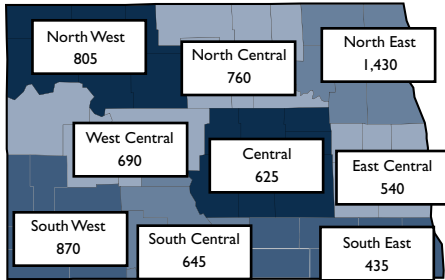
FREYR remains one of the leading production varieties in both North Dakota and Minnesota, ranking third and second, respectively. It is a variety with one of the highest levels of resistance to Fusarium headblight and consistent strong yield performance. It is rated as having very good milling and baking qualities.

SPRING WHEAT VARIETIES
PLANTED ACRES IN NORTH DAKOTA

Variety	2007% ¹	2008% ¹	2008 Acres (1,000)
Glenn	20.9	27.9	1,898.6
Steele-ND	9.1	9.2	626
Freyr	9.5	8.6	585.3
Briggs	9.2	7.6	517.4
Alsen	15.1	7.6	515.1
Howard	0.9	5.1	347.7
Kelby	0.9	4.1	281.5
Knudson	4.4	4.1	276.1
Reeder	8.8	2.5	173.2
Faller	0.1	2.2	146.6
Choteau	0.8	1.7	113.8
Granite	1.9	1.6	109.7
Dapps	1.4	1.3	91.5
Kuntz	0.1	1.3	90.1
Granger	2.2	1.2	83.4
Traverse	0.1	1.1	77.8
Parshall	1.1	1.0	64.7
Other ²	13.5	11.8	801.5

1. Percentages may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage in 2008 and unknown varieties.

NORTH DAKOTA AGRICULTURAL
STATISTICS DISTRICTS 2008
PLANTED AREA (1,000 ACRES)



SPRING WHEAT VARIETIES IN NORTH DAKOTA
SHARE OF 2008 SEEDED ACRES BY CROP DISTRICT

Variety	North West	North Central	North East	West Central	Central	East Central	South West	South Central	South East	State
Percentage (%) ¹										
Glenn	27.4	38.8	32.4	27.5	39.5	27.4	16.6	17.6	17.9	27.9
Steele-ND	17.6	12.5	3.9	6.2	7.1	3.4	18.4	7.7	4.1	9.2
Freyr	17.7	6.4	3.9	14.3	5.8	7.5	7.2	10.4	7.8	8.6
Briggs	0.3	7.1	7.2	1.9	7.3	10.9	5.4	12.6	25.8	7.6
Alsen	8.7	8.7	7.5	14.4	6.9	3.8	4.3	7.2	5.6	7.6
Howard	1.9	4.3	7.6	7.8	3.4	5.7	6.2	2	4.1	5.1
Kelby	3.0	2.6	6.5	1.6	5.9	11	1.3	0.9	4.5	4.1
Knudson	5.6	6.1	2.4	0.8	3.8	1.7	2.5	11	4.3	4.1
Reeder	5.2	0	0	4.5	0	0	6.2	7.2	0.1	2.5
Faller	0.4	2.8	5.4	0.5	2.4	3.5	0.4	0	0.9	2.2
Choteau	0.0	0	0	1.8	0	0	11.6	0	0.2	1.7
Granite	1.3	0.1	1.7	1.9	0.7	3.8	0.1	2.2	4.8	1.6
Dapps	0.8	1.5	0.4	2.3	2.3	0	1.7	2.3	1.9	1.3
Kuntz	0.1	0.6	3.3	0.5	2.9	2.1	0.2	0.2	0.6	1.3
Granger	0.0	0.3	0.1	0.8	2.3	0.1	3.7	2.9	2	1.2
Traverse	0.0	0	2.7	0	0.4	4.2	0	0.4	2.7	1.1
Parshall	0.8	0.3	0.1	1.1	0	0	3.6	2.1	0.6	1.0
Other ¹	9.2	7.7	15.1	12.3	9.4	14.7	10.5	13.5	12.2	11.8
1,000 acres										
All Varieties	805	760	1,430	690	625	540	870	645	435	6,800

1. Columns may not add to 100 due to rounding.
2. Includes varieties with less than 1% of acreage in 2008 and unknown varieties.
3. September 30, 2008 small grains estimate was 6.8 million acres.

MONTANA

Montana Agricultural Statistics Service reports the most popular varieties of hard red spring wheat planted in the state in 2008 are Reeder, Choteau and McNeal. Of 2.50 million acres planted, these three varieties account for 59 percent.

REEDER remains the top variety in Montana for the third straight year. It is a very high yielding variety but it is down from its peak in Montana and areas of western North Dakota due to increasing susceptibility to leaf diseases and leaf rust. It is rated as having good milling and baking quality.

CHOTEAU maintained second place in Montana and also showed strong gains in the southwest part of North Dakota. A 2003 release, it is a solid stem variety that has tolerance to the wheat stem sawfly.

MCNEAL remains in third place with 12 percent of the acres. A longtime popular variety in Montana, it has moderate resistance to the wheat streak mosaic virus and continues to show competitive yields in many areas. Its popularity is being tempered by its susceptibility to leaf rust as well as the wheat stem sawfly. McNeal has uniquely strong dough characteristics.

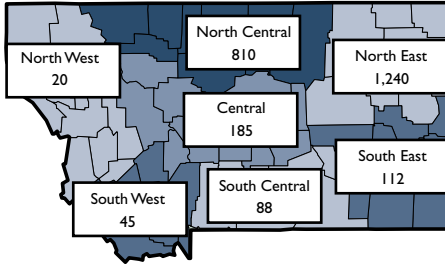
SPRING WHEAT VARIETIES PLANTED ACRES IN MONTANA

Variety	2007% ¹	2008% ¹	2008 Acres (1,000)
Reeder	28.1	24.8	620.1
Choteau	22.4	22.6	564.7
McNeal	14.9	11.8	294.3
Fortuna	4.3	4.1	103.0
Corbin	2.2	3.5	87.0
AC Lillian	0.0	3.0	74.9
Conan	5.0	2.7	69.2
Hank	1.9	2.5	61.8
Ernest	3.1	2.4	59.2
Amidon	1.7	1.8	44.5
Outlook	0.6	1.5	38.9
Kelby	0.0	1.0	24.6
Other ²	15.8	18.3	457.8

1. Percentages may not add to 100 due to rounding.

2. Includes varieties with less than 1% of acreage in 2008 and unknown varieties.

MONTANA AGRICULTURAL STATISTICS DISTRICTS 2008 PLANTED AREA (1,000 ACRES)



SPRING WHEAT VARIETIES IN MONTANA SHARE OF 2008 SEEDED ACRES BY CROP DISTRICT

Variety	North West	North Central	North East	Central	South West	South Central	South East	Total State
Percentage (%) ¹								
Reeder	2.1	1.1	43.6	16.8	0.0	17.0	21.5	24.8
Choteau	0.0	36.9	17.0	18.1	6.8	17.9	2.3	22.6
McNeal	0.0	5.4	15.5	11.2	25.2	16.4	10.7	11.8
Fortuna	0.0	10.4	0.3	5.2	0.0	6.3	0.0	4.1
Corbin	0.0	9.8	0.6	0.1	0.0	0.0	0.0	3.5
AC Lillian	0.0	6.0	1.5	2.8	0.0	2.8	0.0	3.0
Conan	0.0	7.6	0.6	0.0	0.0	0.2	0.0	2.7
Hank	33.9	1.2	0.5	13.8	4.9	12.5	0.4	2.5
Ernest	0.0	4.8	1.5	0.4	1.3	0.0	0.4	2.4
Amidon	0.0	0.8	3.0	0.1	0.0	0.0	0.5	1.8
Outlook	0.0	2.2	1.6	0.7	0.0	0.0	0.0	1.5
Kelby	3.7	0.3	0.9	2.9	0.0	1.4	3.3	1.0
Other	12.1	13.5	13.4	27.9	61.8	25.5	60.9	18.3
1,000 Acres								
All Varieties	20	810	1,240	185	45	88	112	2,500 ¹³

1. Columns may not add to 100 due to rounding.

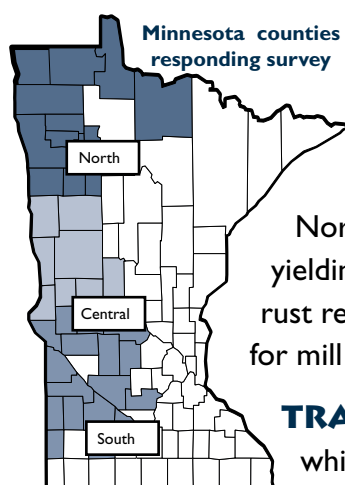
2. Includes varieties with less than 1% of acreage in 2008 and unknown varieties.

3. September 30, 2008 small grains estimate was 2.5 million acres.

MINNESOTA & SOUTH DAKOTA

A Minnesota Wheat Research and Promotion Council 2008 survey indicates the most popular varieties are Knudson, Freyr, Glenn, Oklee and Briggs.

The South Dakota Agricultural Statistics Service 2008 survey shows leading varieties were Briggs, Traverse, Steele-ND, Granger and Forge.



BRIGGS is the dominant variety in South Dakota with one-half of the acres and is the top variety in southeast North Dakota. It is a strong yielding variety that has good leaf rust resistance and is rated average for mill and bake quality.

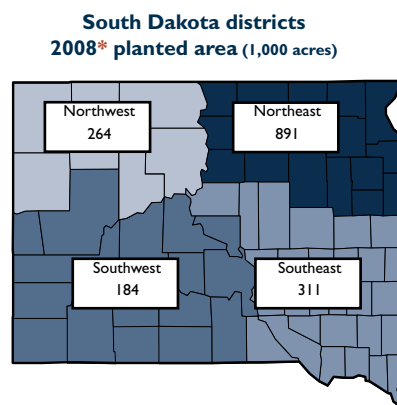
TRAVERSE is a 2006 release which has advanced to second

place in South Dakota. It is noted as being one of the highest yielding varieties and is resistant to Fusarium headblight. It has low protein and is rated as poor for mill and baking quality.

KNUDSON is the leading variety in Minnesota. Its share of acres remained stable from 2007. Its

balance of resistance to Fusarium headblight, leaf rust and leaf disease and very strong yields keep it popular with producers. It is rated as having good milling and baking qualities with extra strong gluten characteristics.

OKLEE is the fourth place variety in Minnesota but is down in its share of acres from 2007 due to its moderate susceptibility to leaf rust.



Spring Wheat Varieties Share of 2008 Minnesota Acres

VARIETY	TOTAL STATE ³		
	NORTH % ¹	CENTRAL % ¹	SOUTH % ¹
Knudson	10.5	16.3	13.4
Freyr	12.7	6.7	8.6
Glenn	11.4	7.6	1.5
Oklee	4.8	16.9	15.4
Briggs	9.9	5.7	4.7
Howard	4.3	8.1	2.9
RB07	5.9	4.8	2.6
Kelby	5.0	4.9	12.5
Steele-ND	5.1	0.8	3.8
Granite	2.3	5.6	8.4
Kuntz	3.3	2.7	8.1
Samson	3.7	2.0	0.0
Alsen	4.1	0.9	0.0
Ada	2.3	3.5	1.6
Granger	2.1	3.6	2.0
Traverse	2.3	1.0	2.4
Oxen	0.6	2.5	5.1
Faller	1.4	1.2	0.3
Walworth	1.2	0.9	0.7
Other ²	7.0	4.4	6.0

1. Columns may not add to 100 due to rounding.

2. Includes varieties with less than 1% of acreage in 2008 and unknown varieties.

3. September 30, 2008 small grains estimate was 1.85 million planted acres.

Spring Wheat Varieties in South Dakota Share of 2008 Seeded Acres by Crop District

VARIETY	NORTH WEST		NORTH EAST		SOUTH WEST		SOUTH EAST		TOTAL STATE % ¹	STATE ACRES (1,000)
	% ¹	% ¹	% ¹	% ¹	% ¹	% ¹	% ¹	% ¹		
Briggs	39.1	58.0	30.8	45.1	49.5	816.6				
Traverse	1.3	9.4	7.8	12.3	8.5	139.7				
Steele-ND	13.2	5.9	0.2	12.6	7.7	126.7				
Granger	9.8	1.5	4.9	4.8	3.8	63				
Forge	1.3	0.7	10.9	4.7	2.7	44.9				
Russ	1.8	2.0	3.9	3.3	2.4	40.0				
Oxen	2.0	1.9	4.0	1.4	2.1	34.3				
Kelby	0.7	2.9	1.2	0.8	2.0	32.4				
Butte 86/Butte	2.7	1.0	5.2	1.2	1.8	29.4				
Reeder	5.4	0.6	1.9	1.3	1.7	27.4				
Knudson	0.0	2.4	0.3	0.1	1.3	21.9				
Glenn	0.5	1.6	0.3	0.8	1.1	18.7				
Freyr	0.1	1.3	2.8	0.2	1.0	17.2				
Other ²	22.2	10.9	25.8	11.3	14.4	237.8				
1,000 ACRES										
All Varieties	264	891	184	311	1,650 ³					

1. Columns may not add to 100 due to rounding.

2. Includes varieties with less than 1% of acreage in 2008 and unknown varieties.

3. September 30, 2008 small grains estimate was 1.6 million planted acres.

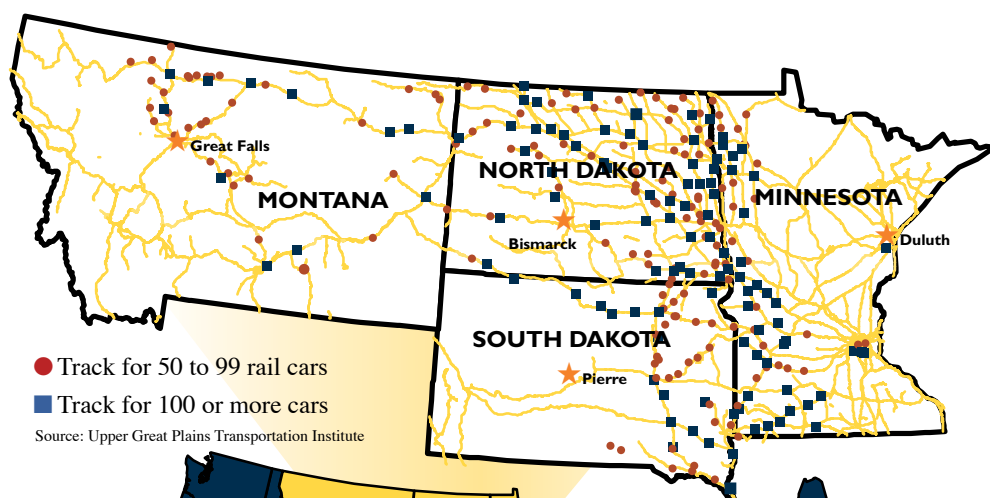
HANDLING & TRANSPORTATION

The hard red spring wheat growing region in the Northern Plains has a vast network of country elevators to facilitate efficient and precise movement to domestic and export markets. On average, nearly 80 percent of the region's wheat moves to markets by rail. Duluth is the only export market serviced by a greater share of trucks. Shipments to the Pacific Northwest and Gulf export markets are almost entirely by rail, with some barge movement to the Gulf. The dominant railroad is the Burlington Northern Santa Fe, followed by the Canadian Pacific.

An increasing number of the elevators in the region are investing in facilities and rail capacity to ship 100 car units. Each rail car holds approximately 3,500 bushels (95 metric tons) of wheat. Some of the 100-car shippers have invested in "shuttle" capabilities. Shuttle-equipped facilities receive the lowest rates, sharing volume and transaction efficiencies with the railroad.

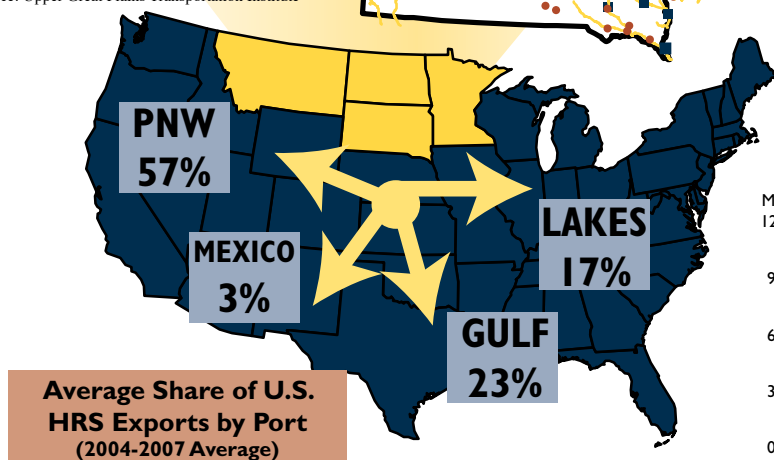
The diverse rail shipping capacities and a widespread network of elevators are strengths that buyers can capitalize on, especially as their demand heightens for more precise quality specifications and consistency between shipments. Buyers are increasingly exploring origin-specific shipments. Many international buyers now find it possible to request wheat from certain locations to optimize the quality and value of wheat they purchase.

The rail and elevator network in the U.S. hard red spring wheat region is well suited for meeting the increasing quality demands of both domestic and international customers.

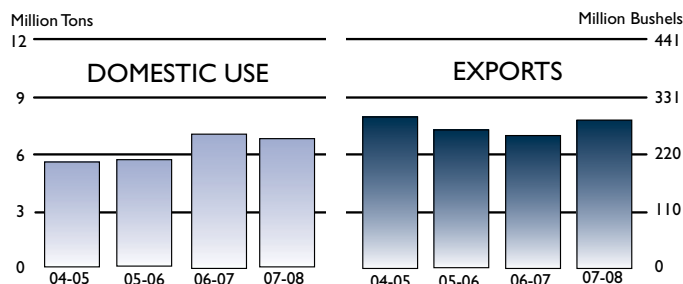


Grain Handling and Transportation Facilities in the Four-State Region

● Track for 50 to 99 rail cars
■ Track for 100 or more cars
Source: Upper Great Plains Transportation Institute



2004-2007 U.S. HRS Domestic USE & Exports



FUNDING & SUPPORT

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